

Nepean Hospital Stage 2 - Transport

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1 Executive Summary

Health Infrastructure NSW (HI) is the applicant for the proposed Stage 2 Redevelopment of Nepean Hospital in Penrith Local Government Area (LGA).

The proposal is State Significant Development (SSD) for the purposes of the Environmental Planning and Assessment Act 1979 (EP&A Act) and clause 14(a) of Schedule 1 of the State Environmental Planning Policy (State and Regional Development) 2011 (SEPP SRD) as it involves development for the purposes of a hospital with a capital investment value in excess of \$30 million.

The Stage 2 Redevelopment seeks to deliver significantly enhanced acute services, as well as a new campus main entry and drop-off area. It complements the recent Stage 1 Redevelopment (SSD 8766) approved in February 2019 and due for completion by early 2022.

The proposed Stage 2 Tower will be located west of, and connected to, the Stage 1 Tower. Portions of the North Block (north section) will be demolished with the remaining sections of the North Block (to the south of the Stage 2 Tower) to remain operational.

Departments to be provided in the Stage 2 Tower include:

- Front of House, including retail;
- Education and Training Centre;
- Transit Lounge;
- Medical Imaging;
- Interventional Radiology;
- Intensive Care Unit and Close Observation Unit;
- In-Centre Dialysis and Renal Inpatient Unit;
- Paediatric In-patient Unit;
- Plant areas;
- Clinical Support areas; and
- Kitchen.

The Stage 2 Redevelopment project scope includes:

- The Stage 2 Tower, being predominantly a 7-storey building, with roof plant;
- Demolition of parts of the existing North Block and other satellite buildings directly within the Stage 2 Tower footprint (excluding other buildings already approved under the Stage 1 SSD consent);
- Demolition of the Total Asset Management (TAM) facility;
- Reconfiguration of the loading dock area and back of house functions;
- Landscaping and other associated at-grade works within the Stage 2 Tower's immediate vicinity; and
- Barber Avenue upgrade and access road to the Stage 2 Tower's forecourt, port cochere, and front of house area.

The Stage 2 Redevelopment's SEARs were issued by the Department of Planning, Industry and Environment on 22 April 2021.

1.1 Proposed Development

Nepean Hospital is the principal health services facility in the Nepean Blue Mountains Local Health District. The district covers the Blue Mountains, Hawkesbury, Lithgow and Penrith local government areas and their 400,000 residents.

Prior to the construction of the Stage 1 building (current under construction) Nepean Hospital currently has 520 inpatient beds and offers adult, paediatric and neo-natal inpatient and outpatient services. The hospital employs approximately 3,400 clinical staff (FTE), of whom approximately 2,500 (FTE) work weekday shifts and 900 (FTE) work weekend shifts, in addition to approximately 100 Visiting Medical Officers (VMOs) being present on weekdays.

To meet the demand for health services from the growing Greater Western Sydney population, Nepean Hospital is proposed to expand through the staged delivery of new assets and services. This transport strategy supports



the State-Significant Development planning application for the second expansion phase, the Nepean Hospital Stage 2 Building. At completion of Stage 2 the Hospital will have 764 inpatient beds; an increase of 78 compared to the current number.

To meet expected the parking demand at completion of Stage 2 a 729-space multi-storey car park has been constructed off Parker Street (completed in 2019), to supplement the existing at grade and multi-storey parking supply on campus.

1.2 Strategic Context and Objectives

The Stage 2 Building is consistent with national, NSW and local policies and plans for the increased provision of services at their point of use in Greater Western Sydney communities which are already expanding under existing regional economic conditions and are forecast to grow at an even faster rate in response to the development of Western Sydney Airport.

When considering the transport planning outcomes of major projects such as the Stage 2 Building, these policies and plans require an approach which integrates land use change with transport systems and encourages the use of public and active transport choices where appropriate.

This approach optimises the use of existing transport assets and services, reduces the rate of growth in congestion, and reduces costs to the wider community from having to pay for new transport infrastructure. Of particular relevance to new health facilities, increased walking and cycling for commuting and other trip purposes also deliver direct benefits for physical and mental wellbeing.

Considering this strategic context, this transport strategy works towards the following thematically grouped objectives:

- Nepean Hospital: Improving community health and wellbeing
 - Improve the delivery of health services to customers
 - Attract and retain a highly qualified workforce
 - Grow health-related education and research activities.
- Greater Penrith: Becoming Western Sydney's gateway
 - Grow employment in the Penrith Health and Education Campus
 - Create a high-quality and active place to live
 - Enhance access to Penrith city centre and Western Sydney Airport.
 - Transport networks: Supporting the growth of Greater Penrith
 - Meet travel needs with safe congestion management and investment solutions
 - Deploy and provide for new technology and service models
 - Increase physical activity as part of day-to-day personal transport

1.3 Existing and Future Access

Making up the bulk of travel to and from its precinct, Nepean Hospital attracts each weekday - in addition to commuting workers - approximately 1,400 outpatient visits and upwards of 600 visitors to inpatients. Approximately one-third of workers live within 15km of the hospital; this increases to well over half for visitors and outpatients.

Most people access Nepean Hospital by car; 95% of staff drive to work (91% on their own) and approximately 85% of outpatients and visitors also drive. The balance uses public transport (train and/or bus), ride a bicycle or walk. There are approximately 2,000 priced, public car parking spaces within the immediate precinct of the hospital. Because peak demand for parking exceeds this figure, and because most kerbside spaces outside the precinct offer free and untimed parking, many cars are parked on local streets within walking distance of Nepean Hospital. The construction of the new multi-storey car park (2019) is designed to meet estimated parking demand at Stage 2, without placing additional burden on the external parking supply.

Based on direct feedback from staff, outpatients and visitors, and on analysis undertaken for this transport strategy, there are many factors behind the currently high dependence on driving for travel to Nepean Hospital. Factors within the collective control of the NSW Transport and Health clusters, and Penrith City Council, include the following:

• There is generally limited user access to information on, and low awareness of, available public transport choices.



- The nearest train station to Nepean Hospital, Kingswood, is serviced by all-stops trains only, and is not directly serviced from stations west of Emu Plains.
- While a relatively attractive east-west bus service frequency (every 10 minutes in both directions) links Penrith and St Marys train stations to Nepean Hospital, the same connectivity is not available for suburbs which are quite close to the north and south of the hospital.
- Walking or bike-riding to Nepean Hospital is made challenging by discontinuous facilities, major road crossings, limited wayfinding and/or a generally unfriendly urban domain. This is particularly true of the walking trip between Kingswood station and the hospital, and during the hours of darkness when afternoon and night shift workers travel.
- Relatively low levels of road congestion, the low cost of car parking for staff with a permanent space and payroll deduction arrangements, and/or the availability of free parking on surrounding streets combine to make driving the most attractive and convenient transport choice.

The Stage 2 (and Stage 1) Building(s) will increase the size of the Hospital's workforce and the number of outpatients and visitors coming to the site. In transport terms, this is forecast to mean that over a whole weekday, with all activities operating at a peak level, the movement of people only (not including goods and service vehicles) into and away from Nepean Hospital will increase from approximately 11,600 daily movements today, to 15,400 daily movements by 2026/27 (Stage 2).

While traffic analysis for the Stage 2 Building has found that additional travel demand can be accommodated by existing assets and services, in the longer term it is important to facilitate a modal shift towards alternatives for three major reasons:

- First: the road network that provides regional access to Nepean Hospital and Penrith city centre will be loaded with additional traffic associated with the development and operation of Western Sydney Airport, and with the broader growth of the Penrith Health and Education Precinct.
- Second: the growth of that precinct will see the continuation of the urban renewal, which is already under way in Kingswood and other parts of the Penrith Health and Education Precinct. As the area becomes denser, both road space and kerb space will be at a premium, and uses such as untimed, free car parking will not be accommodated to the same degree as today.
- Finally: Nepean Hospital as a workplace and health facility, should be accessible to all members of the community including those who cannot drive and do not have access to a vehicle.

To avoid having to force changes in travel behaviour onto the different Nepean Hospital user groups as network capacity limits are approached, it is appropriate to start implementing a Green Travel Plan for the Hospital as soon as possible.

This travel strategy finds that there are many opportunities to progressively promote a shift towards alternative transport choices for the significant proportion of Nepean Hospital users that travel at times of day, and from close enough to the hospital, to make this a viable proposition. These opportunities make use of existing assets and services; leverage current and programmed transport upgrades; draw from lessons learned at other major travel demand generators (including health campuses); and take advantage of new technologies and flexible business models for the delivery of demand-response services.

The actions detailed in chapter 6 of this transport strategy are summarised under the following recommendations.

1.4 Recommendations

- Step one: Promote better use of available travel opportunities
 - Improve the efficiency of existing on-site car parking operations
 - Promote the use of existing walking and bicycle connections
 - Promote the take-up of existing bus and train services.
- Step two: Improve the customer experience, capacity and impacts of existing transport operations
 - Actively manage motor vehicle movements to and within PHC
 - Manage local street network vehicle movements outside PHC in line with Movement and Place principles
 - Upgrade walking and bike-riding facilities, especially wayfinding, with a focus on connections to public transport



- Rearrange existing bus services where possible to address network gaps.
- Step three: Introduce new public and active transport products, and start to shift demand away from driving
 - Deliver new walking and bike-riding connections within and outside PHC, including step-free access to Kingswood station, and between Parker Street and PHC
 - Deliver new on-demand public transport services to fill in remaining temporal, route and capacity gaps, and to penetrate the campus using low-impact vehicles
 - Relocate car parking to one or more satellite locations
 - Manage access to, and the cost of, car parking within and outside PHC based on user need and access to alternative travel options
 - Provide or at a minimum protect the future opportunity for bus priority access on the principal routes to PHC.

1.5 Secretary's Environmental Assessment Requirements (SEARs)

This report has been prepared in accordance with the traffic and transport related comments stated in Secretary's Environmental Assessment Requirements (SEARs) dated 22 April 2021 relating to the SSDA.

The following table presents the SEARs relevant to Transport and Accessibility and confirms that each of these items has been addressed in this report.

SEARSs	Comments and Reference
Item 5 - Transport and Accessibility	
Include a transport and accessibility impact assessment, which details, but not limited to the following:	
 Analysis of the existing transport network, including: o road hierarchy. o pedestrian, cycle and public transport infrastructure. o details of current daily and peak hour vehicle movements based on traffic surveys and/or existing traffic studies relevant to the locality. o existing performance levels of nearby intersections utilising appropriate traffic modelling methods (such as SIDRA) 	 ptc. Traffic Impact Assessment Report Refer to Section 5 Refer to Section 5 Refer to Section 6
 Details of the proposed development, including: a map of the proposed access which identifies public roads, bus routes, footpaths and cycleways. pedestrian site access and vehicular access arrangements, including for service and emergency vehicles and loading/unloading, including swept path analysis demonstrating the largest design vehicle entering and leaving the site and moving in each direction through intersections along the proposed transport routes. car and motorcycle parking, bicycle parking and end-of-trip facilities. drop-off / pick-zone(s) pedestrian, public transport or road infrastructure improvements or safety measures 	 Refer to Section 6 Refer to Section 6 Refer to Section 6 Refer to Section 6 Refer to Section 5 and Section 6
 Analysis of the impacts due to the operation of the proposed development, including: proposed modal split for all users of the development including vehicle, pedestrian, bicycle riders, public transport and other sustainable travel modes. estimated total daily and peak hour vehicular trip generation. a clear explanation and justification of the: 	Refer to Section 6



SEARS	5	Comments and Reference
	 assumed growth rate applied. volume and distribution of proposed trips to be generated. type and frequency of design vehicles accessing the site. 	
0	details of performance of nearby intersections with the additional traffic generated by the development both at the commencement of operation and in a 10-year time period (using SIDRA network modelling).	
0	cumulative traffic impacts from and surrounding approved development(s).	
0	adequacy of pedestrian, bicycle and public transport infrastructure and operations to accommodate the development.	Refer to Section 6
0	adequacy of on-site car and motorcycle parking and bicycle parking provisions when assessed against the relevant car / bicycle parking codes and standards. adequacy of the drop-off / pick-up zope(s) during peak-bour	Refer to Section 6
0	access adequacy of the existing / proposed pedestrian infrastructure to enable convenient and safe access to and from the site for all users	Refer to Section 6
• Mea	sures to ameliorate any adverse traffic and transport impacts due	
to t o	he development based on the above analysis, including: travel demand management programs to increase sustainable transport (such as a Green Travel Plan).	Refer to Section 7
0	arrangements for the Travel Coordinator roles	Refer to Nepean Hospital Green
0	governance arrangements or relationships with state and local government transport providers to update roads safety	Travel Plan (March 2021)Refer to Section 6
0	infrastructure improvements, including details of timing and method of delivery.	Refer to Section 6
• Ana	lysis of the impacts of the traffic generated during construction of	Refer to ptc. Traffic Impact Assessment Report
the	proposed development, including:	
0	construction program (duration and milestones).	
0	on-site car parking and access arrangements for construction, emergency and construction worker vehicles.	
0	cumulative impacts associated with other construction activities in the locality (if any). road safety at identified intersections near the site due to conflicts between construction vehicles and existing traffic in the locality.	
0	measures to mitigate impacts, including to ensure the safety of pedestrian and cyclists during construction.	
• Ana	lysis of the impacts of construction works on the adjoining rail	Refer to ptc. Traffic Impact
cori	ridor prepared in consultation with the relevant rail infrastructure	Assessment Report
aut	hority.	
• A pi	reliminary Construction Traffic and Pedestrian Management Plan	 Refer to ptc, Construction Traffic and Pedestrian Management Plan (CTMP)



2 Introduction

2.1 Nepean Hospital

2.1.1 Current Function

Nepean Hospital is the name given commonly and collectively to the Penrith Health Campus (PHC). PHC land uses comprise the public health service facilities operated by NSW Health (NSWH), private facilities including Nepean Private Hospital (NPH) and ancillary activities such as childcare. PHC constitutes the western portion of the Penrith Health and Education Precinct (PHEP), which extends to the east to incorporate the Penrith Campus of Western Sydney University and TAFE NSW Nepean.

Nepean Hospital is the principal facility of the Nepean Blue Mountains Local Health District (NBMLHD), providing public health services to a large area of Western and Outer Metropolitan Sydney. The NBMLHD is served by several facilities in addition to Nepean Hospital, including Hawkesbury Hospital, Springwood Hospital, Blue Mountains Hospital and Lithgow Hospital.

Nepean Hospital (Figure 1) is the principal referral hospital and regional trauma centre in the NBMLHD and provides a diverse range of services to a population catchment of over 500,000 residents, a figure forecast to double by 2036. The Hospital has 520 inpatient beds and is subject to redevelopment by 2025/26 which will increase this number to 764 inpatient beds ("Stage 2").

Along with health-related education, research and business activities, the health services provided by Nepean Hospital cover:

- 24-hour emergency department
- Surgical (including dental, neurosurgery, orthopaedic, plastic and reconstructive, thoracic, breast and endocrine)
- Acute interventional medicine (such as renal dialysis, aged care, gastroenterology and stroke services)
- Cardiology
- Ear, Nose and Throat (ENT), urology and vascular specialisms
- Cancer care (with the Nepean Cancer Care Centre being located on the Hospital campus)
- Medical imaging
- Mental health
- Community health
- Drug and alcohol services
- Sexual health
- Rehabilitation, pharmacy and allied health.

Specific named institutions located on the Hospital campus are Tresillian Family Care Centre, the Nepean Cancer Care Centre and the Wentworth Centre for Drug and Alcohol Medicine. The Nepean Private Hospital (NPH), operated by Healthscope, is located adjacent to the public hospital and offers a broad range of services.

The Hospital campus is located approximately 3km to the east of the Penrith Civic Centre and approximately 1.2km west of Kingswood Railway Station.





Figure 1 - Penrith Health Campus current site map



2.1.2 Proposed redevelopment

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The proposed redevelopment will provide expanded hospital services and integrated community health facilities for the NBMLHD. The multi-storey car park on Barber Avenue was completed in 2019 and the Stage 1 building is currently under construction.

The proposed redevelopment of Nepean Hospital is consistent with the NSWHI vision and strategic objectives for PHC:

- Vision: To become an international destination for investment in education, health services, research and related technology over the next 10 years
 - o Objective 1. Education, allied health and medical training:
 - To become a nationally recognised centre in allied health services and clinical medical training
 - > Growing academic presence in engineering, arts and related sciences.
 - Objective 2. Health care and innovation:
 - > To improve community health and wellbeing through the development of new technology applications and models of community based health care and service delivery.
 - o Objective 3. Research and technology:
 - Linking community driven research in lifestyle related diseases with healthy life styles, local sporting excellence and facilities.
 - o Objective 4. Business and lifestyle:
 - > To grow Western Sydney health technology sector through initiatives that support the region's emerging innovation ecosystem.

Construction on Stage 2 building will start following the completion of Stage 1.

The timeline for the proposed Stage 2 redevelopment is shown in Figure 2 below:



Figure 2 - Stage 2 Redevelopment Pipeline¹

¹ https://infrastructurepipeline.org/project/nepean-hospital-redevelopment



2.2 Structure of the transport report

It is a requirement that the SSDA be supported by a transport strategy that shows how the health, employment, education and business services offered by the redeveloped Nepean Hospital will be accessible to the community.

In general, this transport strategy must address:

- The broad strategic context for the transport and accessibility outcomes at a redeveloped Nepean Hospital
- Existing transport and accessibility conditions
- The potential impact of the Stage 2 Building on these conditions
- The transport demand management, operational and infrastructure improvements that are proposed to mitigate these impacts and optimise future transport and accessibility conditions.

In specific relation to the vision and strategic objectives for Nepean Hospital illustrated in Section 3, this report addresses opportunities for the Stage 2 Building to achieve the following benefits:

- Benefits for customers (inpatients, outpatients, visitors and the local community) and businesses:
 - o Reduced growth in traffic congestion
 - o Reduced and more reliable travel times by all modes
 - o Improvements to a wider network of public transport services
 - o Energy and other cost savings
 - o Health benefits from an increased use of active transport
 - o Reduced local traffic and overspill parking in adjacent residential areas
 - o General air quality improvements and amenity benefits.
- Benefits for workers:
 - o Reduced cost of travel
 - o Reduced stress from less time spent travelling in local traffic congestion
 - o Improved access to public and active transport choices for work travel
 - o Improved health from increased use of active transport
 - o Improved workplace amenity.
- Benefits for NBMLHD:
 - o Reduced growth in the demand for car parking
 - o Reinvention of existing car parking areas for other purposes, maximising the utilisation of the site for health and education services
 - o Reduced cost of operating and maintaining car parking facilities
 - Improved accessibility to individual PHC facilities, reduced internal congestion and increased operational efficiency
 - o Improved emergency vehicle response and travel times due to reduced network congestion and increased site accessibility
 - o Increased productivity through a healthier and more motivated workforce
 - Reduced reliance on on-street parking in adjacent residential areas leading to reduced traffic and improved safety for the local community
 - o Widened regional and demographic base of potential employees and suppliers
 - o Improved corporate reputation.



2.3 Consultation

This transport strategy is informed by preliminary consultation with major stakeholders as listed in Table 1.

At the time of consultation NSW Government stakeholders were providing input to DPIE² on Secretary's Environmental Assessment Requirements (SEARs) for the Stage 2 project SSDA. Consultation provided an early opportunity to ascertain issues of concern to stakeholders for this strategy to address.

Stakeholder	Business Area		Posponso
Transport for	Land Lise	Application of Austroads	A See Section 4.3.7
NSW	Planning & Development	 Application of Austroads 'Movement and Place Framework' for road categorisation and management. Learnings from approach taken by other health campuses (e.g. Westmead) to management of public car parking. 	 See Section 4.3.7 Car parking will be managed in line with NSW Health policy and consistently with management at other hospitals
	Comise Design G	Coope for improvements to hus	Coo Cootion (E
	Development	 Scope for improvements to bus customer experience at southern entry to PHC. Opportunities for public transport 	See Section 6.5
		 opportunities for public transport patronage growth already offered by high standard of bus service between PHC and Penrith interchange (especially when latter is upgraded). Need to consider future direct bus 	See Section 6.5
		connections to suburbs north and south of PHC, as well as east and west.	
	Interchange & Precinct Planning	 Connections to local walking and bike-riding routes 	• See Sections 6.3 and 6.4
Transport for NSW	Network Sydney	 Not supportive of signalisation of Great Western Highway / Somerset Street intersection. 	Signalisation is not proposed.
Penrith City Council	Economic Initiatives	 Interrelatedness of transport initiatives for PHC and for rest of PHEP ('The Quarter'). 	• Noted. These are long- term proposals. Section 6 of this report makes recommendations for future transport initiatives that seek to increase the take-up of alternatives to the car consistent with Council's approach to 'The Quarter'.
		 Council advocating for Australian Government Western Sydney Infrastructure Program funding for upgrade of the Northern Road to 	Noted. While this report highlights this route as a longer-term bus priority corridor, the operation of the Stage 2

Table 1 - Principal stakeholder issues for Nepean Hospital transport strates

² Department of Planning, Industry & Environment



Stakeholder	Business Area	Issues	Response
		extend beyond Jamison Road to Penrith city centre.	Building does not rely on this.
		• Need for improved local area wayfinding, to minimise local network impacts from drivers looking for car parking spaces.	• See Section 6.8.2
		• Potential medium-term rezoning of local area around PHC (including increased focus on employment generation) and expected changes to currently free and/or untimed car parking.	• Noted
		• Scope for long-term urban domain improvements to northern frontage of PHC, as this orients more towards its Green Western Highway 'address'.	• Noted. To be addressed in future master planning of PHC.

2.4 Abbreviations

DA	Development Application
DIRD	Commonwealth Department of Infrastructure & Regional Development
DPIE	NSW Department of Planning, Industry & Environment
DPI	NSW Department of Planning & Infrastructure
GSC	Greater Sydney Commission
INSW	Infrastructure NSW
NBMLHD	Nepean Blue Mountains Local Health District
NPH	Nepean Private Hospital
NSWH	NSW Health
NSWHI	NSW Health Infrastructure
РСС	Penrith City Council
РНС	Penrith Health Campus (Nepean Hospital and Nepean Private Hospital)
PHEP	Penrith Health and Education Precinct
RMS	Roads & Maritime Services (now Transport for NSW)
SSD	State-Significant Development
TIA	Traffic Impact Assessment
TfNSW	Transport for NSW
WSEA	Western Sydney Employment Area
WSIP	Western Sydney Infrastructure Plan
WSRNSS	Western Sydney Rail Needs Scoping Study



2.5 References

Except where otherwise noted, relevant strategic, policy and site-specific information in this transport strategy has been sourced from the documents listed below. Website addresses are included for the location of public documents.

Australian Bureau of Statistics (2017) QuickStats

http://www.abs.gov.au/websitedbs/D3310114.nsf/Home/2016%20QuickStats

Australian Government's National Urban Policy

https://www.infrastructure.gov.au/infrastructure/pab/files/Our_Cities_National_Urban_Policy_Paper_2011.pdf

Australian Government (2018) Western Sydney City Deal

https://cities.infrastructure.gov.au/western-sydney-city-deal

BVN Architecture (2017) Nepean Hospital - Car Park: Development Application

Cattell Cooper (2018) Health Infrastructure Nepean Hospital and Integrated Ambulatory Services Redevelopment SSDA Transport Report

DPIE (2021) Secretary's Environmental Assessment Requirements - Nepean Hospital Redevelopment Stage 2

DPI (2014) A Plan for Growing Sydney

http://www.planning.nsw.gov.au/Plans-for-your-area/Sydney/A-Plan-for-Growing-Sydney

GSC (2018) Western City District Plan

https://www.greater.sydney/western-city-district-plan

GSC (2018) Greater Sydney Region Plan: A metropolis of three cities - connecting people

https://www.greater.sydney/greater-sydney-region-plan

Infrastructure Australia (2021) Infrastructure Priority List

http://infrastructureaustralia.gov.au/projects/infrastructure-priority-list.aspx

INSW (2018) Building Momentum: State Infrastructure Strategy 2018-2038

http://www.infrastructure.nsw.gov.au/expert-advice/state-infrastructure-strategy/

Integrated Transport and Land Use Strategy 2008 draft report

https://www.hornsby.nsw.gov.au/_resources/documents/council/corporate-documents/transport-and-corporatedocuments/Integrated-Land-Use-and-Transport-Strategy-Final-Report.pdf

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3 Site Context

3.1 Existing Penrith Health Campus

3.1.1 Local Setting

The existing PHC is bordered by the Great Western Highway to the north, Parker Street (the name given to the section of the A9 The Northern Road within Penrith) to the west, Derby Street to the south and Somerset Street to the east.

Motor vehicle, bicycle and (except where driveways directly connect to car parking areas only) walking access is available via Parker Street (two entrances, one via Barber Avenue), Derby Street (one entry) and Somerset Street (two entrances).

For pedestrians only, there are several additional informal entry points available across the relatively permeable southern (Derby Street) and eastern (Somerset Street) local road edges of the campus.

The PHC's approximate centre (where the new Stage 1 and Stage 2 buildings will be located) is approximately 1km walking distance from Kingswood train station. The areas east and west of PHC are characterised by generally low-density housing but with some medium density unit developments which have been constructed in recent years. To the south of PHC (across Derby Street) is the Sydney Medical School Nepean (associated with the University of Sydney).

Approximately 35,700 people live in the suburbs which abut PHC; Penrith (13,630), South Penrith (12,070) and Kingswood $(10,026)^3$.

3.1.2 Subregional and district settings

The site is located in Kingswood, which is approximately 60km west of the Sydney CBD. The Nepean Hospital is located approximately 3km to the east of the Penrith City Centre and Penrith Railway Station, and to the western end of the PHEP (Figure 3), placing it between 2km and 6km west of the various tertiary education facilities located on the Kingswood, Werrington and Werrington South campuses of Western Sydney University and TAFE NSW.

This setting places Nepean Hospital in a strategically central position on the spine of major commercial, retail, health and education land uses that traverses the Penrith Local Government Area (LGA) and its approximately 216,000 residents⁴, which has experienced growth of approximately 9% between 2015 and 2020 according to ABS data. This growth is forecast to continue into the future, with a further 19% increase in the residential population by 2036. Growth is expected given the commitment to Sydney's second airport located immediately to the south of the LGA.

At a broader scale the strategic importance of this spine is recognised in planning by the Greater Sydney Commission (GSC), which has nominated the Greater Penrith to St Marys corridor as a hub of economic activity that links Penrith city centre, and the PHEP, to development opportunities around St Marys.

³ Population data source: Penrith Community Profile

⁴ Population data source: ABS Estimated Residential Population





Figure 3 - Nepean Hospital in context of Penrith Health and Education Precinct

3.1.3 Regional setting

Nepean Hospital is the primary facility in the NBMLHD. This Local Health District (Figure 4) consists of both urban and semi-rural areas, covering over 9,000km² of the Blue Mountains, Hawkesbury, Lithgow and Penrith LGAs and their approximately 385,000 residents.⁵

⁵ Australian Bureau of Statistics 2020 Estimated Residential Population (ERP)





Figure 4 - Map of Nepean Blue Mountains Local Health District

In contrast to its location at the south-eastern extremity of its Local Health District, which extends westwards, Nepean Hospital's principal catchment is weighted in the other direction - towards developed and developing Western Sydney communities to its north/north-east and south/south-east.

Seen in a whole-of-Greater Sydney context (Figure 5) the strategic importance of Nepean Hospital is emphasised by the distance that separates it from the nearest other health facilities of equivalent scale, at Westmead, Liverpool and Campbelltown. Within the hospital's catchment, the new Western Sydney International Airport (and associated development) will rely on Nepean Hospital as the nearest such facility.





Figure 5 - Greater Sydney major health precincts in strategic transport context



3.2 Stage 2 Building

The design of the Stage 2 building (location shown in Figure 6) is integrated with the Stage 1 building, and provides the expansion and upgrade of essential clinical services including⁶:

- an Intensive Care Unit
- Medical Imaging services and Nuclear Medicine
- an in-centre Renal Dialysis Unit
- cardiology services
- more in-patient beds including paediatrics
- clinical support services including Pharmacy
- staff education and training facilities
- community health facilities
- a new front of house and reception area



Figure 6 - Stage 1 and Stage 2 Buildings Site Plan (BVN Architects)

⁶ http://www.nepeanredevelopment.health.nsw.gov.au/projects/stage-2



4 Strategic, Regional and Local context

4.1 Strategic policy and plans

4.1.1 Smart Cities Plan (2016)

Australian Government urban policy objectives are articulated in its Smart Cities Plan which is based on smart investment, smart policy and smart technology. The Plan sets out the prioritisation of projects which deliver on objectives focused on accessibility, jobs, affordable housing and healthy environments.

The Plan formulates the national aspiration of '30-minute cities' where residents can access health and other essential services, jobs, schools, shopping and recreational facilities within 30 minutes of home. Well designed public transport networks and integrated active transport to reduce urban congestion allowing the continued efficient movement of freight will support the operation of our economy and improved urban outcomes.

The Smart Cities Plan invited state governments to partner with the Commonwealth on 'City Deals' aimed at delivering national priorities tailored to local needs. Through 'City Deals' governments, industries and communities will develop collective plans for growth and commit to the actions, investments, reforms and governance needed to implement them. This has led to agreement on the multilateral Western Sydney City Deal.

4.1.2 2021 Australian Infrastructure Plan

The Australian Infrastructure Plan, released in September 2021, presents a roadmap for infrastructure reform. It looks to 'deliver infrastructure for a stronger Australia, and support our national recovery from the stillunfolding COVID-19 pandemic, as well as the bushfires, drought, floods and cyber-attacks that have tested our resilience in recent years.' It focuses on nine key areas including:

- Place-based outcomes for communities unlocking the potential of every location
- Sustainability and resilience balancing infrastructure outcomes in an uncertain future
- Transport delivering an integrated network that provides reliable services which seamlessly connect people and goods
- Social infrastructure supporting economic prosperity and quality of life

4.1.3 Infrastructure Priority List

Infrastructure Australia released the latest iteration of its Infrastructure Priority List in February 2021, providing an update to the Australian Government's Australian Infrastructure Plan. The priority list includes projects of direct relevance to future demand for access to Greater Penrith and the Nepean Redevelopment, as outlined under different categories of priority in Table 2.

Table 2 - Infrastructure Australia Infrastructure Priority List: Projects relevant to Penrith Health and Education Precinct access

Proposed Project	Problem category and description	Proposed delivery timescale		
High Priority Projects:				
 Potential infrastructure solutions for which a full business case has been completed and been positively assessed by the Infrastructure Australia Board Address a major problem or opportunity of national significance 				
M12 Motorway	Efficient urban transport networks: Motorway capacity in Western Sydney	Near term 0-5 years		
Western Sydney Airport	National Connectivity: Sydney aviation capacity	Medium term 5-10 years		
Priority Initiatives:				
 Potential infrastructure solutions for which a business case has not yet been completed Seeks to address a problem or opportunity of national significance 				
Western Sydney Airport public transport connection	Regional Connectivity: Access to Western Sydney Airport	Medium term 5-10 years		



4.1.4 Western Sydney Airport

The 2021 Infrastructure Priority List reconfirms the Australian Government's commitment to the development of a second airport for Greater Sydney, as a High Priority Project.

Sydney is Australia's primary aviation gateway, accounting for around 40% of the nation's international services, 43% of domestic services and 45% of international air freight. Demand for airport services in Greater Sydney is forecast to grow beyond the capacity of Kingsford Smith Airport by the 2030s. The Western Sydney Airport project includes initial (within 10 years) construction of a 3,700m runway with a parallel taxiway, and associated aviation terminal infrastructure and support precincts.

The new airport itself will be located roughly equidistant between the strategic centres of Penrith and Liverpool and their major hospitals (see Figure 7). However, the extension and intensification of the Western Sydney Employment Area (WSEA) catalysed by the new airport's development will place most of the more than 57,000 jobs forecast to be yielded by the WSEA over the next 30 years closer to Penrith, and therefore to Nepean Hospital.



Figure 7 - Western Sydney Priority Growth Area



4.2 Western Sydney City Deal

The Western Sydney City Deal was announced in March 2018, bringing together the three levels of government, and drawing on policy directions, as referenced in the preceding sections. The City Deal has been agreed between Australian, NSW and local governments; the eight Western Parkland City local councils, including Penrith, are signatories.

The Western Sydney City Deal captures a range of commitments to support the sustainable growth of the Western Parkland City, including investment to leverage regional benefits from the development of Western Sydney Airport.

Under the 'Connectivity' theme the City Deal focuses on Australian and NSW government joint support for the first stage of a North South Rail Link, from St Marys (east of the PHEP) to WSA-Badgerys Creek Aerotropolis (Figure 8). Subject to investigation, further stages in this corridor will provide transport connections north to Marsden Park and Schofields, and south to Campbelltown-Macarthur.

In addition, and in parallel to rail link planning and development, the NSW Government will establish rapid bus services from metropolitan centres - including Penrith - that connect to WSA before it opens, and to the Aerotropolis.



Figure 8 - Strategic corridors for Western Parkland City: (left) Western Sydney City Deal connectivity; (right) Outer Sydney Orbital corridor identification



4.3 Regional policy and plans

4.3.1 A Plan for Growing Sydney (2014)

The NSW Government's 2014 plan for the growth of Greater Sydney, A Plan for Growing Sydney, provided directions to guide the city's productivity, environmental management and liveability, including the delivery of employment and infrastructure. A major action area for the plan aimed to transform the productivity of Western Sydney through growth and investment. A Plan for Growing Sydney has been a key part of the foundation for strategic planning for Western Sydney health assets over the past eight years.

Under the plan, Penrith was designated as one of Western Sydney's three regional city centres, along with Campbelltown-Macarthur and Liverpool (see **Error! Reference source not found.**). Separate but adjacent to P enrith city centre, the PHEP (Figure 3) - primarily Nepean Hospital and the Kingswood campus of Western Sydney University - was designated a strategic centre. The plan classified strategic centres as locations that currently have or are planned to have at least 10,000 jobs, and are priority locations for employment, retail, housing, services and mixed-use development (Direction 1.7).

In this context, supporting the growth of the PHEP plays an important role in the achieving the following outcomes that A Plan for Growing Sydney has aspired to for Western Sydney:

- Providing new jobs close to centres that are accessible to large and growing residential catchments
- Diversifying the mix of job opportunities within these catchments
- In particular, improving access to 'knowledge jobs' in employment sectors characterised by technological or other forms of innovation and learning.

For the communities oriented towards Penrith city centre, the contribution to available knowledge jobs resulting from investment in Nepean Hospital, Western Sydney University and associated facilities will only be surpassed by the employment growth catalysed by Western Sydney Airport.

Given this, it is relevant to the ongoing growth and importance of Nepean Hospital that it is not only located between Penrith city centre and the Kingswood education campus, but strategically positioned on the extended regional corridor between Penrith city centre, the WSEA and the new airport (Figure 9). The importance of this extended regional corridor was recognised in the focus of A Plan for Growing Sydney on north-south transport connections servicing the new airport, including the upgrade of The Northern Road (reconfirmed as a Priority Project by Infrastructure Australia) and the Outer Sydney Orbital investigations referenced in Section 4.6.1.

At a subregional level, A Plan for Growing Sydney reinforced the importance of Penrith as a provider of employment and services to benefit the North West and South West Growth Centres and highlighted it as a significant location for the complementary and coordinated growth of the health and education sectors in particular (Direction 1.10).

At a local level, the plan recognised that Penrith should be a focus for improved public transport services and walking and cycling accessibility. As the strategic centre complementing Penrith city centre's CBD function within the plan's West Subregion, the PHEP was highlighted as a priority location for investment. This was flagged as involving:

- A continuing primary role for Nepean Hospital
- Mixed use development to co-locate new offices, shops and housing with health and education Facilities
- Focusing this type of development around Kingswood train station and the Great Western Highway corridor that connects the station to the hospital
- Improving the walking and cycling connectivity of Penrith city centre, Nepean Hospital, Kingswood train station and Western Sydney University
- Investigation of a longer-term direct rail connection between the precinct and Western Sydney Airport.

These aspirations for the PHEP are prime examples of A Plan for Growing Sydney calling out opportunities for the design of Sydney's built environment to facilitate physical activity and social cohesion (Direction 3.3).





Figure 9 - Greater Western Sydney (A Plan for Growing Sydney)

4.3.2 Greater Sydney Regional Plan (2018)

The Greater Sydney Commission (GSC) is the lead delivery agency for A Plan for Growing Sydney, tasked with coordinating across agencies to deliver infrastructure and urban planning priorities for the metropolis.

The GSC released the final Greater Sydney Region Plan in March 2018. To support the Western Parkland City (Figure 10) the plan confirms the importance of Greater Penrith (Figure 11) as a 'Metropolitan Cluster'.

This designation is based around existing and planned commercial, health and education assets. It signifies the role ahead for Greater Penrith - to support the Western Parkland City by providing a northern focus for commercial activities and population services as the newest of Greater Sydney's three metropolises develops over the next 20 years. As the Western Parkland City grows, so will housing, employment and other activities in Greater Penrith; this will be the key service centre relied on by the northern part of the Western Economic Corridor catalysed by the development of the Western Sydney Airport-Badgerys Creek Aerotropolis.





Figure 10 - Metropolis of three cities (Greater Sydney Region Plan)

In the health services space, the Greater Sydney Region Plan identifies the opportunity to enhance the Western Parkland City's economic growth through Greater Penrith's development as one of a ring of university towns that also includes Liverpool and Campbelltown-Macarthur. Specific to this growth opportunity for Greater Penrith is the scope to anchor its tertiary education presence in investment in the \$1.1 billion upgrade of Nepean Hospital (\$550 million for Stage 1 and \$450 million for Stage 2, additional \$89m in 2021/22 NSW Budget), facilitating the emergence of a health and education precinct.

Such precincts are described on the Greater Sydney Region Plan as transit-accessible areas where health and education assets are co-located, leading to the emergence of associated medical research institutions and a supporting mix of complementary industry tenants, housing, ancillary facilities and services. Under the right circumstances agglomeration benefits and improved urban productivity can flow from the proximity of these land uses and generate export growth in the form of overseas student enrolments.



Figure 11 - Vision for Greater Penrith (Greater Sydney Region Plan)

For Greater Penrith, as for other Greater Sydney health and education precincts, the Greater Sydney Region Plan finds that realising these advantages requires coordinated action across:

- The development and implementation of integrated land use and transport plans for the PHEP (Figure 3) as a whole, placing PHC in the context of complementary education and ancillary activities
- Urban design and servicing decisions that promote high levels of accessibility at different scales across the PHEP, so that it is easy to move between different parts of the precinct by transit and active transport (improving local amenity) as well as by car
- The development of housing that can accommodate students and workers within 30 minutes by transit or active transport from the PHEP.

To help with this process, the plan states that the GSC will facilitate whole-of-government efforts by designating Greater Penrith a Collaboration Area, coordinating the establishment of governance arrangements and driving the delivery of place-based outcomes.

4.3.3 Western City District Plan

The GSC approaches its role on a district-by-district basis. Changes to the boundaries of these districts (compared with A Plan for Growing Sydney subregions) have resulted in Penrith LGA forming part of the Western City District that comprises eight local council areas from north of the Hawkesbury River to Bargo in the south west and west into the Blue Mountains. The population of this Western Parkland City will grow from 1.07 million in 2018 to over 1.5 million people in the next 20 years.

Following draft exhibition, the finalised Western City District Plan was released in March 2018. The Western City District Plan elaborates on the generic directions established under A Plan for Growing Sydney and further developed in the Greater Sydney Region Plan. In applying these directions to Penrith LGA the plan recognises the proximity of Greater Penrith to the Aerotropolis of urban development that includes, supports and is catalysed by the new Western Sydney Airport (Error! Reference source not found.).



Relevant directions applied and actions stipulated by the GSC, and the relationship of these to the Nepean Redevelopment, are extracted and discussed below. This demonstrates how matters from the Greater Sydney Region Plan and the Western City District Plan have been considered in the Stage 2 Building planning proposal.

- Direction 1: A city supported by infrastructure
 - o Objective 2: Infrastructure aligns with forecast growth growth infrastructure compact.
 - o Objective 7: Infrastructure adapts to meet future needs.
 - o Action: Prioritise infrastructure investments to support the vision of A Metropolis of Three Cities.
- Direction 3: A city for people celebrating diversity and putting people at the heart of planning
 - o Objective 6: Services and infrastructure meet communities' changing needs.
 - o Objective 7: Communities are healthy, resilient and socially connected.
 - o Action: Deliver social infrastructure that reflects the needs of the community now and in the future
 - Action: Deliver healthy, safe and inclusive places for people of all ages and abilities...by providing walkable places at a human scale with active street life, prioritising opportunities for people to walk, cycle and use public transport [and] co-locating schools, health, aged care, sporting and cultural facilities.
- Direction 6: A well connected city developing a more accessible and walkable city
 - o Objective 14 A Metropolis of Three Cities Integrated land use and transport creates walkable and 30-minute cities.
 - o Action: Support innovative approaches to the operation of...institutional establishments to improve the performance of the transport network.
 - o Action: Investigate and plan for the land use implications of potential long-term regional transport connections.
- Direction 7: Jobs and skills for the city creating the conditions for a stronger economy
 - o Objective 20 Western Sydney Airport and Badgerys Creek Aerotropolis are economic catalysts for Western Parkland City
 - o Objective 21 Internationally competitive health, education, research and innovation precincts.
 - Action: In addition to the Collaboration Area process...reinforce, capitalise and support the expansion of the Penrith health and education precinct...capitalise on opportunities associated with the Western Sydney Airport including Western Sydney City Deal initiatives [and] improve transport connectivity, walkability and safe cycling connections within and to the Penrith City Centre.

The Western City District Plan places the PHEP at the heart of a Collaboration Area (Figure 12) that also comprises Penrith CBD and the tourism precinct to the west - a place where significant productivity, liveability and/or sustainability outcomes are best achieved through the collaboration of different levels of government and in some cases the private sector or landowners. Under this designation, and subject to resources, the GSC will directly facilitate the efforts of the many agencies, stakeholders and interest groups that are planning for Greater Penrith's future.





Figure 12 - Greater Penrith Collaboration Area (Western City District Plan, 2018)

Priorities under the Western City District Plan for the Greater Penrith Collaboration Area include:

- Growing employment by 35% to 45,000 jobs over the next 20 years
- Revitalising Penrith CBD
- Improving housing diversity and providing affordable housing
- Implementing healthy city initiatives and improving social infrastructure
- Protecting and expanding the PHEP.

Local employment in the PHEP grew by nearly 300% from 2001 to 2011, when it accommodated 6,000 jobs; as a tertiary education site the vision of the Western City District Plan is for the precinct to accommodate at least 10,000 students. The upgrade of Nepean Hospital will be the catalyst in enhancing innovation, research, health and education activities, such as the Nepean Clinical School that is one of the eight Clinical Schools of the University of Sydney.

To support the planned expansion of the PHEP, the Western City District Plan indicates that flexible land use zoning is required to attract mutually complementary businesses such as health and medical research activities, private hospitals, allied health, ancillary retail, and accommodation for visitors, carers and the aged.

The growth of Greater Penrith, including the PHEP, as a Metropolitan Cluster has implications for the land use and transport setting for the Hospital redevelopment stages.

The PHEP is at the centre of Greater Penrith (Figure 3) and Nepean Hospital is in prime position within this precinct, midway between a significant road intersection and a train station. The streets around the hospital are prime candidates for the development of housing choices to service hospital and other PHEP workers, plus co-located schools and other mixed used development components. To east and west, the hospital needs suitable transport connections to Penrith city centre, other parts of the PHEP and longer-distance transit services.



At a fine-grained level, the Western City District Plan finds that 'place-based' and design-led planning of the Greater Penrith public realm should result in places and streets that are safe and functional, supporting people's choice to walk or ride a bike rather than drive. Walkable, well-lit places and paths can provide a sense of safety for the more vulnerable user groups who may be present in relatively higher numbers around health facilities, including women and older people. The most important active transport corridors for recreation and longer-distance bicycle travel will be created through the completion and interconnection of open space linkages in the Western Parkland City's Green Grid.

Within the buildings that people are walking or riding to, end-of-trip facilities, such as workplace lockers and showers, will increase the incidence of physical activity within practical travel. This will improve the sustainability of Greater Penrith, enhancing access without flow-on growth in congestion.

Ultimately, safe and accessible environments will be conducive to more active lifestyles, helping to reduce obesity and the rate of chronic illnesses such as diabetes and cardiovascular disease. This is especially important for the long-term health of Penrith residents, given that the Western City District Plan reports that in 2015 nearly three in five adults in the previously designated West District (which correlates to the Western Parkland City) were overweight or obese.

4.3.4 Long Term Transport Master Plan and Associated Modal Plans (2012-13)

The 2012 Long Term Transport Master Plan, including its supporting mode and place-specific plans, set out the NSW Government's intentions to improve transport infrastructure and services to sustain growth in Greater Sydney. Key master plan directions and actions that have provided direction to planning for the Stage 2 Building include the following (in summary):

- Tailor transport and congestion solutions for Penrith that:
 - o Recognise its status as one of Western Sydney's three regional cities
 - o Are developed in coordination with Penrith City Council
 - o Facilitate access by Western Sydney residents to jobs that are located close to where they live
 - Improve north-south connections, including between Penrith and both the North West and South West Growth Centres
 - Increase public transport mode share for the high proportion of trips into Penrith city centre that originate within the subregion (Figure 13), thereby decoupling jobs growth from worsening traffic congestion
 - o Improve public transport travel times between Penrith and other Western Sydney strategic centres including Campbelltown-Macarthur and Prairiewood and protect these from congestion-related decay.





Figure 13 - Origins of Journeys to Work in Penrith (2012)

Of the mode-specific plans supporting the Long Term Transport Master Plan, Sydney's Cycling Future (2013) speaks specifically to local connectivity needs extending from Penrith city centre as far as Nepean Hospital (Figure 14). The cycling plan stated that the NSW Government would work with Penrith City Council on a bicycle network including an off-road path along the Great Western Highway between Penrith city centre, Nepean Hospital and Western Sydney University.





Figure 14 - Penrith strategic bicycle corridors (Sydney's Cycling Future)

Rail and bus plans identified through the Long Term Transport Master Plan have now been superseded by planning for Western Sydney International Airport and the Aerotropolis, which together now provide a focus for rail and bus network planning and service delivery within Western Sydney.

4.3.5 Future Transport Strategy 2056

The Long Term Transport Master Plan has been updated through the *Future Transport Strategy 2056* ("*FTS 2056*") initiative, which culminated in the release of a finalised document in March 2018. In terms of the prioritisation of different modal outcomes and the impact of these on specific places, the *FTS 2056* and supporting *Greater Sydney Services and Infrastructure Plan* build on the directions established by the *Long Term Transport Master Plan* and relevant supporting modal plans.

In its overarching intent, *FTS 2056* addresses how the transport of people, goods and services in NSW will grow and change over the next 40 years. This has involved considering and responding to the major trends impacting on transport planning and operations in NSW. These trends can be summarised as follows, with observations on the implications of each for the Stage 2 Building:

- Rapid technology change
 - It is difficult to predict at this point in the lifecycle of proposals such as the Stage 2 Building what new technological solutions to its transport needs will become viable within the life of the project.
 - As part of the project, the design of new movement networks, and the land uses they connect, must allow for some adaptation to new technologies.
- Customer demand
 - o Informed customers are demanding and obtaining more 'personalised' transport services.
 - Where limited-frequency scheduled public transport services might previously have been the only alternative to driving for medium-distance trips in lower-density areas like Penrith LGA, new operators are starting to offer affordable and attractive demand- responsive services in such markets.
- Live, work and study anywhere



- Working and studying from home are becoming more feasible for more people. Workers in administrative and other non-frontline roles may be able to avoid commuting on one or more days each week.
- o In parallel, accessing treatment from, or closer to, home may reduce the need for face-to-face presentations for some health services.
- Environmental sustainability and energy security
 - The NSW Government aspires to net-zero emissions by 2050 in all service delivery sectors, including transport.
 - Public transport will need to transition to renewable sources of electricity. This will require new fleet and other assets - and will have flow-on benefits from the reduction in noise and tailpipe emission impacts (as traditionally associated with buses) on sensitive land uses such as hospitals.
- Growing international trade
 - The operation of Western Sydney Airport, starting in the next decade, will increase the flow of people travelling along major transport corridors south of Penrith.
 - o Given uncertainty about the timing of construction of new rail links to service these movements, and the need to minimise car dependence, early investigation and delivery of high-quality road-based public transport services including rapid buses is required.
- Our growing and ageing population
 - o There will be increasing demand for the health services provided through Nepean Hospital.
 - Older people are less likely to drive; a larger proportion of the hospital's patients will face mobility challenges in accessing its services.
- The need for healthier lifestyles
 - There is growing awareness in all parts of NSW of the health impacts from road congestion and sedentary lifestyles.
 - Designing developments such as the Stage 2 Building in ways that make it easier for people to reach them by walking or riding a bike will help activate lifestyles and reduce chronic illness; ease congestion and lower emissions; and create great places that are competitive in attracting skilled workers.

The *Greater Sydney Services and Infrastructure Plan* includes specific Western Parkland City initiatives of direct relevance to future access conditions for the PHC. These are summarised in Table 3.

FIELINCE ALLESS		
Initiative	Description and benefit	Timeframe
Western Sydney	Include upgrades to The Northern Road and	0-10 years committed
Infrastructure Plan and	growth areas roads; will capitalise on economic	
Growth Roads Program	benefits from developing Western Sydney Airport	
Priority Cycleway links in	Priority Cycleway links connecting centres	0-10 years committed
the Western Parkland City	including Penrith, to be developed and delivered	
	in partnership with local councils where	
	appropriate; will support walking and cycling as	
	most convenient option for short trips around	
	centres	
North-south rail link in	New rail link linking Northwest and Southwest	0-10 years investigation
Western Parkland City:	growth areas with WSA-Badgerys Creek	(north of St Marys)
Cudgegong Road - St Marys	Aerotropolis; will extend 30-minute train service	0-10 years committed
- WSA - Badgerys Creek	catchment of Greater Penrith	(south of St Marys)
Aerotropolis		
Infrastructure to support	New dedicated bus links or implementation of	0-10 years investigation
rapid bus connections and	bus priority on existing and new roads; will	
improved bus connections	enable efficient and reliable rapid bus travel	
between WSA-Badgerys		

Table 3 - Greater Sydney Services and Infrastructure Plan: Projects relevant to Penrith Health and Environment Precinct access



Initiative	Description and benefit	Timeframe
Creek Aerotropolis and		
Penrith		
Outer Sydney Orbital from	Reservation for future north-south motorway	10-20 years investigation
Great Western Highway to	and freight rail operations, with first stage	
WSA-Badgerys Creek	to connect Great Western Highway to WSA-	
Aerotropolis	Badgerys Creek Aerotropolis; will provide	
	continuous bypass of Greater Sydney, ultimately	
	connecting Illawarra, Sydney and Central Coast	

The FTS 2056 does not directly affect the existing arrangements, but the potentially improved frequency of trains would serve staff who live within the wider area of Sydney to commute to the Hospital.



Figure 15 - Greater Sydney Mass transit / train network (visionary) (Source: Future Transport 2056 Strategy)

The *FTS 2056* has the vision to construct a safe cycleway network within 10km of Greater Penrith area. This document appears to address a broader vision and is aimed to provide connectivity on a larger scale. This plan, if implemented, may benefit patrons (e.g. staff, visitors etc.) who live outside Kingswood.

Growing Sydney's visionary bicycle network is shown in Figure 16.




Figure 16 - Growing Sydney's bicycle network (visionary) (Source: Future Transport 2056 Strategy)

4.3.6 Building Momentum: State Infrastructure Strategy 2018-2038

The *State Infrastructure Strategy 2018-2038* notes the budgeted commencement of the Penrith Health and Education Precinct redevelopment will contribute towards over \$1.5 billion worth of investment in more than 20 projects for the PHEP, which should generate an additional 12,000 jobs by 2036.

To support the growth of Greater Penrith and the larger Western Parkland City the strategy makes the following findings or recommendations relevant to the Nepean Redevelopment and/or PHEP:

- Strategic transport corridors should be planned and protected for road and rail connections to and through the Western Parkland City.
- Rail connections via the Western Sydney Airport should be a priority for construction once they are justified by patronage having reached a critical mass, which is forecast to occur around 2036.
- Pending that time, reallocating key corridor road space to efficient and sustainable modes is critical for the desire lines where rail is planned but a patronage base has not yet developed.





Figure 17 - Priority movement corridors for Western Parkland City (State Intrastructure Strategy 2018-2038)

- To this end, the existing and under-construction Western Parkland City arterial road network provides the opportunity to introduce a high quality rapid bus system to connect Western Sydney Airport to metropolitan centres including Penrith, as the new city takes shape.
- As shown by corridor (3) on Figure 17 this network would potentially use The Northern Road, which passes Nepean Hospital, to access Penrith city centre.
- Staged investment in mass transit for the Western Parkland City should be undertaken in partnership with the Australian Government.
- A staged approach will help to shift personal travel demand away from congested roads and towards more efficient modes of transport. Complementary actions to reduce, re-time or re-route movement will unlock the capacity of existing assets.



4.3.7 Movement and Place Framework

A major new direction in integrated road network and land use planning that is reflected in Future Transport involves the application of a 'Movement and Place Framework'. This framework is used to categorise roads according to their relative importance as corridors for the movement of people, goods and services, and places where people shop, live, work, socialise, walk and so on. The framework is illustrated in Figure 18, with Table 4 describing the five different road categories.

Table 4 Movement and race trainework road categories			
Road Category	Function		
Motorway	Motorways are strategically significant roads that move people and goods rapidly over long distances.		
Movement corridor	Movement corridors provide safe, reliable and efficient movement of people and goods between regions and strategic centres.		
Vibrant street	Vibrant streets have a high demand for movement as well as place with a need to balance different demands within available road space.		
Place for people	Places for people are streets with high demand for activities and lower levels of vehicle movement. They create places people enjoy, attract visitors, and are places communities value		
Local street	Local streets are part of the fabric of the suburban neighbourhoods where we live our lives and facilitate local community access		

Table 4 - Movement and Place Framework road categories



4.3.8 Planning Guidelines for Walking and Cycling

The Guidelines, prepared in 2004, provide guidance on how urban development can be planned to encourage and support the increased take up of walking and cycling. The guidelines cover design at a neighbourhood scale to create accessible centres and connected streets. The detailed design of road reserves, transit stops and stations, developments and open space all contribute to the creation of a locality that supports and encourages people to walk and cycle.



4.4 Local policy and plans (Penrith City Council)

4.4.1 Penrith Health and Education Precinct 2017-2021 Action Plan

Consistent with the focus of the Greater Sydney Region Plan and Western City District Plan on the importance of health and education precincts, a group of stakeholders including Penrith City Council (PCC), NBMLHD and Western Sydney University has prepared an action plan for the PHEP, to advocate for priority directions and actions. The action plan has recently been released in the context of an announced rebadging of this precinct as 'The Quarter, Penrith'. The announcement references stakeholders' support for The Quarter becoming a major destination for investment and excellence in health care, medical research, education and related technology, supported by new infrastructure including Western Sydney Airport, major road upgrades and the expansion of Nepean Hospital.

The action plan includes a retrospective review of 2011-2016 outcomes for the precinct. This records the delivery in 2012 of a multi-storey car park in the PHC south-eastern quadrant; notes the growing need for additional car parking on the campus; and, looking ahead, acknowledges that travel demand management strategies are required to reduce reliance on driving among the PHC workforce.

In resetting the future transport and accessibility priorities for the precinct, as it grows from today's 6,000 jobs to accommodate potentially 12,000 by 2036, the action plan advocates for relevant actions including the following:

- Nepean Hospital and surrounding lands: Focus on health services, clinical education and medical research. Focus also on private medical services, particularly where the Nepean Hospital campus directly interfaces with existing commercial zones
- Kingswood town centre: Focus on providing precinct services and new forms of accommodation in a high amenity urban setting
- Connecting the Precinct to the North West and South West Growth Centres and the main Western Line via passenger rail with a dedicated station
- Stronger transport and pedestrian links between PHEP and the Penrith City Centre including more bus services
- Improved pedestrian access between Nepean Hospital campus and Kingswood station
- Blue Mountains train services to stop at Kingswood Station
- Public domain improvements to enhance amenity and safety.



4.4.2 Local development conditions

The urban form immediately surrounding PHC is dominated by low-density residential areas with local retail, commercial and health-related elements, and some car parking facilities on vacant lots. However, there is visible evidence of this form currently increasing in density, with at least five new apartment buildings of 5-6 levels each (which also provide for ground-floor retail/commercial activities) recently constructed that are located within five minutes' walk of the campus, on Derby Street, on the Great Western Highway and on Parker Street next to a midblock pedestrian crossing that directly accesses PHC (shown in Figure 19).



Figure 19 - New apartment block developments adjacent to Penrith Health Campus

4.4.3 Pedestrian Access and Mobility Studies

Penrith City Council's Business Paper Ordinary Meeting dated 2 April 2001 discusses the potential preparation and implementation of the Pedestrian Access and Mobility Plan (PAMP) - Footpath Improvement Program. This report informs Council of findings and recommendations of the Penrith LGA Access and Mobility Plan. The plan prioritises the revised outstanding footpaving projects, based on: - proximity to pedestrian generators; estimated traffic volume; nature of predominant users (young, old, disabled, parents with prams, etc); and evidence of wear. The priority list was prepared to help in the selection of footpaving projects as part of the annual project evaluation and footpath selection process.

It is noted that this document is 20 years old and it appears that the PAMP has not been prepared / implemented.



4.4.4 Bicycle Plans

Penrith Accessible Trails Hierarchy Strategy 25 June 2012 (PATHS) project focuses on delivering a plan and strategic links with some localised recreational loops integrated into the Strategy.

The major intention of PATHS project is to enhance the safety of the trails network by planning off-road shared pathway and enhance the safety of the on-road sections by implementing clear line marking and bike lanes in order to benefit all people with diverse abilities who want to use the trails network to access a destination.

PATHS is presented in Figure 20. The project shows potential upgrades of trails within the vicinity of the site, which appear to have been constructed.





4.4.5 Integrated Transport Strategies or TMAPs for the area

Penrith City Council's Integrated Transport and Land Use Strategy 2008 draft report states that the Penrith Integrated Transport and Land Use Strategy (PITLUS) action plan includes a series of short, medium and long term measures implemented by Council and partnership agencies.

The action plans are city wide including land use planning, road management, active transport, public transport, parking, Travel Demand Management / Educational or Local Action Plan including suburban, rural, Penrith City Centre, St Marys Town Centre, Residential Urban Release Area and Employment Urban Release Area.

4.4.6 Local Area Traffic Management (LATM) Plans

Penrith City Council's Integrated Transport and Land Use Strategy 2008 draft report states that in order to reduce the severity and number of accidents occurring in Penrith LGA and improve the overall safety for all road users, it is recommended that the Council implements its Road Safety Plan including the local area traffic management study for crash analysis and speed and volume surveys.

4.4.7 Parking Management Strategies or Kerb Management Plans

Penrith City Council's Penrith City Centre Car Parking Strategy 2011 outlines actions to improve the access around the City Centre by walking, cycling, public transport and private cars. This strategy provides a framework for future actions and initiatives identified across short, medium and long-term horizons. Managing parking and improving access strategy includes understanding access and transport issues within Penrith, plan for improved access to the City Centre and review car parking provision.

4.4.8 Mode Specific Transport Plans

No documents have been found relating to Council active and public transport target initiatives. However, Penrith City Councils *Penrith Development Control Plan 2014* informs that Council seeks to promote and facilitate walking and cycling within transit-oriented precincts by establishing and maintaining high levels of amenity, safety and permeability in the urban form. The DCP also encourages bicycle use by providing sufficient number of secure and accessible bicycle parking spaces within new developments. The following is listed regarding cycle facilities:

- 1. Cycleways
 - a) All cycle routes and facilities are to be consistent with the relevant requirements of "Austroads Cycling Aspects of Austroads Guides" and Roads and Maritime Services' "Bicycle Guidelines" including line-marking, signage and logos and Council policies regarding bicycle access.
 - b) The minimum width of off-street shared cycle and pedestrian pathways is to be 2.5m on local routes with a minimum of 3m on major connector routes.
 - c) Pedestrian and cycle routes and facilities in public spaces are to encourage way finding and be convenient, safe, well lit, clearly defined, functional and accessible to all.
 - d) Shared paths and pedestrian refuge islands are to be designed to be fully accessible by all in terms of access points and gradients, in accordance with Australian Standard 1428:1-4.
- 2. Provision of Bicycle Parking Spaces
 - a) For commercial developments providing employment for 20 people or more, bicycle parking is to be in secure and accessible locations, and provided with weather protection, in accordance with AS2890.3:1993 Bicycle Parking Facilities.
 - b) The following associated facilities are to be provided:
 - i) Change and shower facilities for cyclists are to be conveniently located close to the bicycle storage areas; and



- ii) Where the building is to be strata-titled, the bicycle storage facilities and shower/change facilities are to be made available to all occupants of the building.
- c) Applicants should comply with the suggested bicycle parking provision rates for different land use types in the document 'Planning Guidelines for Walking and Cycling' (NSW Government 2004).
- 3. Design of bicycle spaces
 - a) Bicycle parking spaces must:
 - i) Be provided in accordance with AS2890.3:1993 Bicycle Parking Facilities;
 - *ii)* Be located to provide convenient access from surrounding bicycle routes and main building entrances;
 - iii) Not interfere with reasonable access to doorways, loading areas, access covers, furniture, services and infrastructure; Not cause a hazard; and
 - iv) Be adequately lit during periods of use.
 - b) A bicycle compound or a bicycle locker must:
 - *i)* Be located to provide convenient access to other bicycle facilities including showers and change rooms;
 - ii) Be fully enclosed;
 - iii) Be able to be locked; and
 - iv) If outside, provide weather protection for the bicycle.

4.4.9 Public Transport Networks

Penrith City Council's *Local Strategic Planning Statement - March 2020* states that Council has established planning priority to provide a safe, connected and efficient local network supported by frequent public transport options. The document states that the city-shaping infrastructure will connect Penrith with Greater Sydney more easily and quickly. This proposed infrastructure includes:

- The new North South Rail Link from St Marys to the Western Sydney Aerotropolis (to be operational by the time the airport opens in 2026).
- The M9/Outer Sydney Orbital road and freight corridor that connects the south west to the north west (for investigation in the next 10-20 years).
- Rapid Bus Connections between Penrith and the Western Sydney International (Nancy-Bird Walton) Airport (for investigation in the next 10 years).
- The Western Sydney Freight Line, providing a freight rail connection to Western Sydney

The plan focuses on development of a public transport connection between Penrith, the Western Sydney Airport and St Mary's in a broader concept.



4.5 Health-related planning context

4.5.1 NSW Government Healthy Urban Development Checklist

This resource was produced by NSWH in 2009 in recognition of the direct influence of the built environment on people's levels of physical activity, social engagement, and personal safety and security. These are major factors governing the prevalence of both physical and mental 'lifestyle diseases' and risk-to-health factors, including overweight and obesity, diabetes mellitus type 2, heart disease and depression. The checklist assists NSWH in developing its capacity to support healthy urban environments in several ways:

- By positively influencing policies, plans and proposals advanced by others
- By building and improving access to the evidence base on the relationship between the built environment and population health
- By ensuring that healthy population outcomes are considered when providing access to existing and new social infrastructure including hospitals, community health centres and allied health professionals.

Desirable outcomes from these activities are increased levels of walking and bike-riding to, from and within major urban facilities, and in combination with public transport use for access from across a broader region. Additionally, the increased presence of and interaction between people in open space and other public areas has benefits for social connectedness as well as individuals' safety and security.

4.5.2 NSW Health Hospital Car Parking Fees Policy

PHC is subject to this 2013 policy, which applies to Greater Sydney campuses planning to undergo or undergoing significant car park expansion works. The policy stipulates these guiding principles:

- Support a sustainable model for the procurement, funding and operation of new hospital car parks.
- Support equitable, transparent and sustainable accessibility to health campuses for all users including patients, visitors and staff, including those with special needs.
- Recognise that the parking needs of many patients and visitors need to be met on-site.
- Ensure economic viability towards the development of new car park infrastructure.
- Improve traffic management around health campuses.
- Ensure the fees policy complements the Government's State Plan to encourage greater public transport usage, particularly increasing the proportion of total journeys to work by public transport, while recognising that many health care workers are shift workers and public transport may not provide a suitable level of accessibility at all times.

In line with the above principles, the policy requires the following specific factors to be considered when setting and receiving car parking fees:

- Prevailing market rates for parking, to discourage non-hospital-related use
- The cost of alternative access modes, including public transport fares, to encourage these choices
- Opportunities for any car parking fee revenue to be allocated, once the capital cost of car parking construction has been met, to ancillary access improvements including lighting, signage, active transport end-of-trip facilities and shuttle bus services.

In 2013, the policy set minimum, time-based public car parking fees in a range from \$6 for 16-60 minutes (the first 15 minutes being free) to \$18 for more than five and up to 24 hours. Current public parking fees range from \$6.80 to \$20.20 respectively. Staff parking fees were set at \$21 per week in 2013; the current staff rate is \$23.60 per week.



4.6 Secretary's Environmental Assessment Requirements

The Stage 2 SEARs provided by DPIE to NSWHI in April 2021 requires to include a transport and accessibility impact assessment which details, but is not limited to, the following:

- Analysis of the existing transport network, including:
- o road hierarchy.
- o pedestrian, cycle and public transport infrastructure.
- o details of current daily and peak hour vehicle movements based on traffic surveys and / or existing traffic studies relevant to the locality.
- existing performance levels of nearby intersections utilising appropriate traffic modelling methods (such as SIDRA network modelling).
- Details of the proposed development, including:
 - o a map of the proposed access which identifies public roads, bus routes, footpaths and cycleways.
 - pedestrian site access and vehicular access arrangements, including for service and emergency vehicles and loading/unloading, including swept path analysis demonstrating the largest design vehicle entering and leaving the site and moving in each direction through intersections along the proposed transport routes.
 - o car and motorcycle parking, bicycle parking and end-of-trip facilities.
 - o drop-off / pick-zone(s)

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- o pedestrian, public transport or road infrastructure improvements or safety measures.
- Analysis of the impacts due to the operation of the proposed development, including:
 - o proposed modal split for all users of the development including vehicle, pedestrian, bicycle riders, public transport and other sustainable travel modes.
 - o estimated total daily and peak hour vehicular trip generation.
 - a clear explanation and justification of the:
 - assumed growth rate applied.
 - volume and distribution of proposed trips to be generated.
 - type and frequency of design vehicles accessing the site.
 - details of performance of nearby intersections with the additional traffic generated by the development both at the commencement of operation and in a 10-year time period (using SIDRA network modelling).
 - o cumulative traffic impacts from any surrounding approved development(s).
 - o adequacy of pedestrian, bicycle and public transport infrastructure and operations to accommodate the development.
 - o adequacy of on-site car and motorcycle parking and bicycle parking provisions when assessed against the relevant car / bicycle parking codes and standards.
 - o adequacy of the drop-off / pick-up zone(s) during peak-hour access.
 - o adequacy of the existing / proposed pedestrian infrastructure to enable convenient and safe access to and from the site for all users.
- Measures to ameliorate any adverse traffic and transport impacts due to the development based on the above analysis, including:
 - o travel demand management programs to increase sustainable transport (such as a Green Travel Plan).
 - o arrangements for the Travel Coordinator roles.
 - o governance arrangements or relationships with state and local government transport providers to update roads safety.
 - o infrastructure improvements, including details of timing and method of delivery.
- Analysis of the impacts of the traffic generated during construction of the proposed development, including:
 - o construction vehicle routes, types and volumes.



- o construction program (duration and milestones).
- o on-site car parking and access arrangements for construction, emergency and construction worker vehicles.
- o cumulative impacts associated with other construction activities in the locality (if any).
- o road safety at identified intersections near the site due to conflicts between construction vehicles and existing traffic in the locality.
- measures to mitigate impacts, including to ensure the safety of pedestrian and cyclists during construction.
- Analysis of the impacts of construction works on the adjoining rail corridor prepared in consultation with the relevant rail infrastructure authority.
- A preliminary Construction Traffic and Pedestrian Management Plan.

This transport strategy addresses these issues, except for service vehicle arrangements and construction traffic management.

4.6.1 Outer Sydney Orbital corridor identification

Complementing strategic and multilateral announcements in the Western Sydney City Deal, in March 2018 the NSW Government commenced public consultation on a recommended land corridor for a future north-south motorway and freight rail line bisecting the Western Parkland City. As foreshadowed by Future Transport this would accommodate a continuous, multimodal bypass of Greater Sydney, ultimately connecting the Illawarra, Greater Sydney and the Central Coast.

As shown in Figure 8 the recommended Outer Sydney Orbital corridor parallels the indicative alignment of a passenger North South Rail Link between WSA and Greater Penrith. The orbital corridor would potentially cross the M4 motorway and the Main Western rail line near Werrington, west of the indicative passenger rail crossing point and close to the eastern end of the PHEP. The Strategic Environmental Assessment of the corridor finds that the section south of the PHEP, between Orchard Hills and Cobbitty (and passing Western Sydney Airport) has the potential to be co-located with the North South Rail Link.



5 Existing Transport networks and services

5.1 Overview

5.1.1 Nepean Hospital user groups

Table 5 lists the groups of users currently making trips to, from and within PHC.

User Group	Quantity
Staff (clinical, administrative and support services; full-time equivalent)	3,457 (comprising 2,524 staff on weekday shifts and 933 staff on weekend shifts)
Inpatient beds (used at 95% occupancy rate)	486 (including 60 neonatal / paediatric)
Visitors to Inpatients (per weekday; see below)	577 - 1,452
Outpatients (per weekday)	1,402
Emergency department presentations (per weekday)	192
Other individual users (VMOs, retail staff, NBMLHD fleet, students and volunteers; per weekday)	213
Child Care Centre (child places and staff)	75
Users not counted (deliveries, services, and clients of Tresillian	Not available

Of the three main groups of Nepean Hospital users, staff and outpatient numbers can be validated to a high degree of accuracy by NSWH as the operator of the hospital. In contrast, NSWH has in the normal course of its operations less visibility of the number of people visiting inpatients at Nepean Hospital. Based on information available for health services across Greater Sydney, NSWH currently undertakes planning based on an assumption that each hospital bed generates 1.25 visitors per day.

It is noted that this rate is likely to vary across different customer demographics and clinical facilities, depending both on social factors and on the type of beds in question. For instance, it has been reported that each bed in the Children's Hospital at Westmead generates up to 10 daily visitors.

NSWHI is in the process of obtaining data on the daily visitor generation rate specific to Nepean Hospital. Pending this, the quantity of visitors assumed for this transport strategy ranges from a lower figure (based on 1.25 visitors / bed) to a higher figure (based on an average 2 visitors / adult bed and up to 10 visitors / neonatal or paediatric bed).

5.1.2 Users' trip origins

Latest surveys indicate that, based on postcode of residence, the three largest user groups are currently travelling to Nepean Hospital over the distances shown in Table 6. The larger proportion of both outpatients and visitors living within 15km of the hospital is to be expected given, respectively, the geographic definition of the NBMLHD area and the somewhat wider area still across which inpatients' family and friends would live. However, it is noted that a significant number - over one in three - of hospital workers also live within this radius, notwithstanding the longer-distance commutes to Western Sydney facilities typically encountered among, especially, senior clinical staff. The distribution of staff home locations by postcode area, and the concentration within the Penrith LGA can be seen in Figure 21.





Figure 21 - Staff home locations by postcode area

User Group	Living within 15km radius	Living within 15-30km radius	Living beyond 30km radius
Staff	>35%	>22%	<43%
Visitors	57%	14%	29%
Outpatients	67%	16%	17%

Table 6 -	Distance	of travel	to	access	Nepean	Hospital	by user	groups

Note: Percentages rounded to nearest 1%

5.1.3 Staff time of travel

Staff surveys indicate that, of all the people working in the hospital, on any weekday at least 40% travel to and from work during the daytime, if this period is defined as between 7am to 6pm and therefore comprises administrative staff and clinical staff on a day shift. In contrast, at most 60% travel to and/or from work outside of these hours; this percentage comprises all other shift workers, an unspecified number of whom - in non-clinical roles - work a day shift.

5.1.4 Users' mode of travel

Based on November 2016 surveys of staff, outpatients and visitors, the current weekday mode of travel to Nepean Hospital for the three largest groups of users is as shown in Table 7.

While driving is the dominant access mode for these users, the occupancy level of cars driven to the hospital varies according to trip purpose. On average, both visitors and outpatients arrive with 2.2 persons per vehicle. In the case of visitors, this is to be expected based on the typical number of daily visits to an inpatient. For outpatients, a driver is required where the patient is a child or otherwise mobility-challenged; or the patient may require a support person during or after their appointment. In contrast, most staff drive to work on their own.



User Group	Active transport mode share	Public transport mode share (incl taxi)	Car mode share (incl. solo driver)
Staff	3.5%	1.8%	94.8% (91% solo driver)
Visitors	3.9%	12.4%	83.7% (38.5% solo driver)
Outpatients	5.8%	8.8%	85.4% (25.5% solo driver)

Table 7 - Access mode share by Nepean Hospital user groups

5.1.5 Social and demographic characteristics of catchment population

Key socio-economic characteristics for each of the LGAs in the Nepean Hospital catchment are presented in Table 8. As can be seen the community in Lithgow and the Blue Mountains is older and through a comparison with historical census data it can also be seen that these communities are ageing, with reducing proportions of children and increasing proportions of the community in the older age groups. The labour force participation rate is relatively low and the unemployment rate higher than the state average (6%) amongst the Lithgow community. Consequently, the median household income is relatively low and the LGA has the lowest SEIFA 1 score amongst the four LGAs.

The Blue Mountains, Hawkesbury and Penrith had rates of unemployment lower than the state average (6.3% at the 2016 Census) and of the four LGAs, have the highest SEIFA scores. Within the Penrith LGA, more than one in five of the population was born overseas, making this the most ethnically diverse of the four areas. While unemployment is just below the state average the relatively low SEIFA score indicates there are likely to be pockets of disadvantage.

Table 8 - Community profile data				
Population Characteristic	LGA			
(2016 Census unless stated)	Lithgow	Blue Mountains	Hawkesbury	Penrith
Population (2020 ERP)	21,516	79,195	67,749	216,282
Proportion born overseas	9.2%	16.8%	12.3%	21.6%
Average household size	2.3	2.5	2.8	2.9
Median household income	\$984	\$1,468	\$1,668	\$1,658
Average age	45	44	38	34
Labour force participation	48.3%	59.9 %	65.3%	65.0%
Unemployment	7.8%	4.7%	4.3%	5.7%
SEIFA score	923	1045	1028	999

Figure 22 shows household vehicle ownership across the four LGAs. Hawkesbury has the highest level of household vehicle ownership, while Lithgow has the lowest. Across the catchment, just over 7,200 households (6%) do not have a vehicle.





Figure 22 - Household vehicle ownership (2016 Census)

5.2 Vehicular Access to the Site

Vehicle access to the Hospital Campus is provided in a number of locations in order to serve the various car parks, loading areas and the Emergency Vehicle areas. The key inbound vehicle routes to the Hospital are as follows, and the existing vehicle access locations are presented in Figure 23.

- Route 1: West Inbound vehicles travel along the Great Western Highway, then onto Parker Street to access the Hospital either via Barber Avenue or the Hospital Entrance, as well as the new multi-storey car park entries off Barber Avenue or the Hospital Entrance;
- Route 2: North There is no vehicular access along the northern boundary of the Hospital precinct.
- **Route 3: South** Inbound vehicles travelling along Derby Street can access the Hospital via the Sydney Medical School entrance or utilise the off-street car park within the campus;
- Route 4: East Inbound vehicles travelling along Somerset Street are able to access the Hospital via the Hospital entrances at Somerset Street north of Hargrave Street and Somerset Street north of Rodgers Street, as well as via the multi-level car park entry off Somerset Street.





Figure 23 - Existing Nepean Hospital Campus Vehicular Access Locations

5.3 Transport safety

Historical data for road crashes occurring during the five-year period between 2015 and 2019 on the road network adjacent to PHC (provided by the TfNSW Centre for Road Safety⁷) are shown in Figure 24. The road network shown includes local streets east of PHC which are used by a significant number of staff and other PHC users for parking their car before walking to the campus.

Figure 24 highlights the intersections at which a concentration of crashes has been observed. These include the intersection of Parker Street and Barber Avenue (which will provide the principal point of access to the new multi-storey car park on the western side of PHC) and the intersection of the Great Western Highway with both Parker Street and Somerset Street.

Figure 25 shows the proportion of motor vehicle users to active transport users involved in minor, moderate and serious injury road crashes. As can be seen, more vulnerable road users - people walking or bike-riding - are particularly represented in crashes around PHC that have resulted in serious injury.

⁷ https://roadsafety.transport.nsw.gov.au/statistics/interactivecrashstats/lga_stats.html?tablga=4





Figure 24 - Road crash history on Penrith Health Campus surrounding road network (2015-2019)



Figure 25 - Road crashes around Penrith Health Campus by degree of casualty and road user class



5.4 Public transport

A number of public transport options are available in the vicinity of the site in the form of buses and rail. The NSW Planning Guidelines for Walking and Cycling 2004 (the Guide) suggests a distance of 400m as a walkable catchment to access local amenities. The Guide also recommends that an 800m catchment is an acceptable, walkable distance if the development is within an area with public transport links. Furthermore, the document also suggests a distance of 1,500m is a suitable catchment for cycling for accessibility to public transport facilities and local amenities.

Due to COVID-related Public Health Orders, from 19 July 2021 all public transport services within Greater Sydney have run to a reduced timetable. To assess the 'normal' frequency of services, the latest valid public transport service timetables <u>prior to 19 July 2021</u> were used in this section.

5.4.1 Heavy Rail

The closest station, Kingswood Railway Station, is located approximately 1.1km or a 14 minute walk from the existing main hospital entry, which is considered to be within reasonable walking distance for staff and, potentially, outpatients and visitors. Those with walking difficulties may find this a less attractive transport mode share, although taxi and shuttle bus connections are available between the station and the hospital.

The station is on the T1 Western Line, from Emu Plains and Richmond to the City. Services operate every 5 - 15 minutes during peak hours, with services operating from 3.16am to 11.36pm on weekdays and 3.48am to 12:22am on weekends.

Whilst the station is only approximately 600m walking distance from the nearest, north-eastern entrance to PHC, it is about another 500m to the primary hospital buildings within the campus that are the destination for most staff, visitors and outpatients (as shown in Figure 26). This effective walking distance is likely beyond the capacity of anyone with mobility difficulties, especially when part of the walk occurs next to and/or across the busy and noisy Great Western Highway.

The local street environment between the station and the hospital does not encourage walking. The walk can be uncomfortable during the warmer months, and passes licensed premises and other land uses which contribute to the local environment being perceived as threatening, especially at night. Alternative routes which avoid the highway and use local streets are quieter but also have personal safety drawbacks due to low levels of passive surveillance.







Figure 26 - Walking routes (north & east) between Kingswood train station and PHC

Walking trips between Kingswood station and the closest clinical facilities in the north-eastern quadrant of PHC are made (from a customer's perspective) unnecessarily long by the single, eastern exit from the station platforms facing in the 'wrong' direction to the hospital. The location of signalised crossings of the Highway also increases the walking distance. Rail passengers wanting to access the hospital can safely cross the Great Western Highway and Bringelly Road, to the east of the station. The location of the station access/egress can result in people who want to access the hospital heading west along the northern side of the highway as soon as they exit the station, expecting to encounter a pedestrian crossing but then having to cross the 6-lane highway mid-block, go back to the Bringelly Road intersection or walk further to the Parker Street intersection. This is not helped by the lack of signage to guide customers before and immediately after they leave the station. Station platform signage references Western Sydney University, but not Nepean Hospital (Figure 27). On exiting the station there is no locality map or wayfinding signage, with the only directional sign being small, on the other side of the highway and illegible from the station exit (Figure 28).





Figure 27 - Platform signage at Kingswood train station



Figure 28 - Pedestrian wayfinding signage at Great Western Hwy/Bringelly Rd intersection outside Kingswood train station

Closer to the hospital, the walk passes through areas where people perceive that their personal safety and security are at risk from antisocial behaviour. This perception is associated with facilities providing drug and alcohol services that are concentrated in the north-eastern quadrant of PHC, and with areas of public open space outside and adjacent to this corner of the campus. Finally, the intersection of Somerset Street and the



Great Western Highway presents safety risks to pedestrians crossing; vehicles turn out of or into this at speed, with drivers primarily focused on entering or crossing two or three lanes of fast-moving traffic as they make their turn (Figure 29).



Figure 29 - Intersection of Somerset Street and Great Western Highway, Kingswood



5.4.2 Bus

The Hospital Precinct is serviced by the bus routes presented in Table 9. There are two bus stops located on the southern boundary of the Hospital Precinct and two bus stops on Great Western Highway, as indicated in Figure 30.



Figure 30 - Local Bus Services Map

While Nepean Hospital's principal bus stops on Derby Street, are close to destination facilities, the walk from them into the campus is indirect, making the walk overly long and difficult to navigate. As shown by Figure 31 and Figure 32, someone getting off a bus from Penrith (north side of Derby Street) needs to take a circuitous walking route on a sometimes narrow footpath, around car parking areas and via a marked road crossing that is offset from an internal roundabout. Signage is limited to a site map (highlighted on Figure 31) that is barely visible from the point of entry to the campus.

The location of westbound bus stop (south side of Derby Street) requires someone to take an indirect route given the location of the unsignalised midblock pedestrian crossing of Derby Street. The crossing is also poorly located for people walking between the hospital and the medical centre and associated facilities an 68 Derby Street.





Figure 31 - Bus stop infrastructure and wayfinding signage at PHC Derby Street entrance



Figure 32 - Walking routes between Derby Street bus stops and Nepean Hospital Southern block

The hospital is relatively well serviced by bus, with a number of routes and regular services (every 30 minutes on weekdays), and therefore provides an alternative mode share option for hospital staff and visitors, subject to the availability of convenient bus stops close to their home location. Given the number of services operating between Penrith Station and St Marys Station via Derby Street the effective frequency is much higher than that for individual services, and buses offer a fast and frequent connection between rail services and the hospital. This is particularly important for those staff, patients and visitors travelling from the Blue Mountains and beyond who can alight from rail services at Penrith and connect with a bus service to the hospital.

Table 9 - Bus Service Summary

Route No.	Coverage	Frequency
677	Richmond to Penrith	Weekdays: Services every 60 minutes in the morning peak and 2 services in the
		evening peak
		Weekends: Services every 120 minutes
774	Mount Druitt to Penrith	Weekdays: Services every 30 minutes, between 5:10am and 10:15pm
		Saturday: Services every 60 minutes, between 5:33am and 10:22pm
		Sunday: Services every 60 minutes, between 7:35am and 9:34pm



Route No.	Coverage	Frequency
775	Mount Druitt to Penrith	Weekdays: Services every 30 minutes, between 5:01am and 10:46pm
		Saturday: Services every 60 minutes, between 7:59am and 10:56pm
		Sunday: Services every 60 minutes, between 7:59am and 9:56pm
776	Mount Druitt to Penrith	Weekdays: Services every 30 minutes, between 5:17am and 10:41pm
		Saturday: Services every 60 minutes, between 8:29am and 11:26pm
		Sunday: Services every 60 minutes, between 8:29am and 10:26pm
780	Mount Druitt to Penrith	Weekdays: Services every 15-30 minutes, between 5:47am and 10:38pm
		Saturday: Services every 60 minutes, between 7:00am and 9:51pm
		Sunday: Services every 60 minutes, between 7:11am and 7:26pm
789	Luddenham to Penrith	Weekdays: 2 services every weekday, at 7:54am and 4:48pm
		Weekends: No services

5.5 Walking and cycling

The locality was reviewed for features that would attract active transport trips (walking and cycling), with reference to the NSW Guidelines for Walking and Cycling (2004). The Guidelines suggests that 400-800m is a comfortable walking distance when considering the distance to public transport, which equals a 5-10 minute walk. A 15 minute walk, or 1,200m distance is seen as acceptable if walking is the only mode of transport.

The comfortable cycling distance is defined by the Guide to be between 800m-1,500m, which equals a 5-10 minute cycle.

The following sections describe the existing pedestrian and cycling infrastructure in the vicinity of the Hospital. Based on these findings, a gap analysis has been undertaken and ways to improve walkability and cyclability are suggested.

5.5.1 Walking

Walking is a viable transport option for distances under 800-1,200m (approximately 12 - 20 minutes) and is often quicker for short trips door to door. Walking is also the most space efficient mode of transport for short trips and presents the highest benefits. Co-benefits where walking replaces a motorised trip include improved health for the individual, reduced congestion on the road network, and reduced noise and emission pollution.

Figure 33 shows the "as crow files" and the actual 400m, 800m and 1,200m walking catchments from the hospital.





Figure 33 - 400m, 800m and 1200m Walking Catchment

South of the Great Western Highway, the hospital campus is surrounded by predominantly low-density (mostly single storey) residential development. The area to the north of the Highway is predominantly light industrial and bulky goods. The topography of the area is relatively flat. Therefore, walking should be a viable option for people living within an 800m - 1,200m walk from the hospital.

Footpaths are currently provided around the hospital frontage, which are generally wide and can adequately accommodate two-way pedestrian flow.

The location of existing pedestrian crossings in proximity to the hospital campus are shown in Figure 34. As can be seen there are no crossings on the eastern side of the campus along Somerset Street, although this is the main path of entry to the precinct from the east, including Kingswood Station.

As discussed above, the local area is not pedestrian friendly. The Great Western Highway is a six-lane road which runs east-west adjacent to the rail line. Together the Highway and rail line form a barrier preventing easy access to/from the north. The Highway can present a hostile walking environment due to traffic volumes and the nature of retail and other establishments that front the south side of the Highway. Walking between the hospital and residential areas east, south and west of the hospital is considered more likely.





Figure 34 - Existing Pedestrian Crossings



5.5.2 Cycling

It is noted that the cycling infrastructure in the Penrith region is relatively underdeveloped, with no dedicated bicycle paths in the vicinity of the hospital (as shown in Figure 35). The surrounding road network does offer a grid of "bicycle-friendly" residential roads with relatively level terrain, making cycling a viable method of travel for those comfortable riding on roads.

The path along the northern side of the Great Western Highway does offer a route for longer distance cyclists from the east.



Figure 35 - Cycling Route Map (Source: Google)

Consistent with many other hospitals, cycling is likely to be an attractive mode share for daytime staff only, and for those who live within a relatively close distance of the campus. It is an important low cost travel option for people who cannot drive and/or do not have access to a vehicle. For shift workers cycling can be an essential transport options, offering greater flexibility than public transport out of hours and at weekends.



6 Future Transport and Access

6.1 Overview

6.1.1 Demand growth

To this point, future increases in the demand for travel to PHC have focused on vehicle travel. Previously demand was calculated for the purposes of planning the use, and addressing the network impacts of the 729-space multi-storey car park that was delivered in 2019, prior to the Stage 1 Building development. The estimated increase in activity across different hospital user groups resulting from Stage 1, and requiring the additional car parking, is shown in Table 10 for future years 2020/21 (Stage 1) and 2026/27 (Stage 2).

Based on these estimates, over the full 24 hours of a theoretical weekday with all activities operating at a peak level, the movement of people (i.e. not including goods and service vehicles) to and from Nepean Hospital increases from approximately 11,600 daily movements today, to 15,400 in 2026.

User group		Current 2021/22 Quantity ⁸ Stage 1 estimate		2026/27 Stage 2 estimate
Staff (clinical,	Weekday	2,524	2,951	3,249
administrative and support services; full-time equivalent)	Weekend	933	1,092	1,202
Inpatient beds (used at 95% occupancy rate; including not less than 60 neonatal / paediatric beds)		486	721	764
Visitors (per weekda	ay; see note)	577 - 1,452	856 - 1,922	907 - 2,408
Outpatients (per we	ekday)	1,402	1,634	1,916
Emergency department presentations (per weekday)		192	229	274
Other individual users (VMOs, retail staff, MBMLHD fleet, students and volunteers; per weekday)		213	252	287

Table 10 - Future growth in Nepean Hospital user groups

Note: As per 5.1.1, quantity of visitors per weekday ranges from lower figure (based on NSWH assumption of 1.25 visitors/bed) to higher figure (based on average 2 visitors / adult bed and up to 10 visitors / neonatal or paediatric bed)

For the purposes of planning for Stage 2 (2026/27)⁹ staff, outpatient and visitor car mode shares are assumed to remain the same as current, that is, for staff 93% will arrive by car, for outpatients 61% will arrive by car, and for visitors 71% will arrive by car. Green Travel Plan initiatives may assist in reducing the number of car drivers and will also assist those who cannot drive, including temporarily due to medical reasons, or do not have a vehicle available to them.

The quantum of people using public and active transport is expected to remain relatively low for at least the next ten years, however, it is important to ensure alternatives are available to facilitate access to healthcare and employment, and to support an increased take up of sustainable modes over time.

6.1.2 Strategic directions

Having summarised the local and strategic context for the Stage 2 Building (Section 3), and outlined current transport outcomes and issues affecting the site (Section 5), several in-principle objectives, and related action focus areas, have been developed for this transport strategy, under three key themes. The proposed objectives and related areas for action are intended to:

- Provide a framework for assessing the relative effects of the building for transport and accessibility outcomes experienced by different user groups
- Guide the development and prioritisation of measures to address these effects where required

⁸ Per ptc. parking demand report 29 March 2017

⁹ Per ptc. parking demand report 28 January 2021 (base case)



• Align these measures with relevant NSW Government urban management priorities.

The proposed objectives and area for action are summarised in Table 11.

Table 11	- Nepean Hospital transport strategy objectives	

Key theme	Strategic objectives	Focus areas for action in transport strategy
Nepean Hospital: Improving community health and wellbeing	Improve the delivery of health services to customers	 Provide multi-modal, needs-based transport access to health services Address needs that vary by customer group, origin, demographics and/or time period
	Attract and retain a highly qualified workforce	 Support improved public and active transport connectivity to the hospital to ensure a range of transport options are available Increase the use of public and active transport by staff for whom this is a viable option Make Nepean Hospital a pleasant place to move around through the working day Maintain and manage appropriate access to staff car parking
	Grow health-related education and research activities	 Strengthen transport linkages between the hospital and: Penrith city centre Western Sydney University Western Sydney Airport-Badgerys Creek Aerotropolis WSEA
Greater Penrith: Becoming Western Sydney's gateway	ter Penrith: ming Western ey's gateway Health and Education Campus	 Improve access to the PHEC from: Penrith city centre Western Parkland City district Greater Sydney
	Create a high-quality and active place to live	 'Decouple' urban growth from increased congestion and reduced amenity by: Developing people-friendly places Encouraging walking and bike-riding Increasing public transport use
	Enhance access to Penrith city centre and Western Sydney Airport	 Short-term: provide good private and public road-based connections, including rapid bus services parallel to future rail Medium / long-term: reserve rail corridor/s and deliver new train services
Transport networks: Supporting the growth of Greater Penrith	Meet travel needs with safe congestion management and investment solutions	 First, maximise the capacity and productivity of existing transport services and assets Then, deliver additional network capacity
	Deploy and provide for new technology and service models	 Enable and pilot innovations in the design and operation of transport services Ensure that new and upgraded transport assets 'build in' future technology opportunities
	Increase physical activity as part of day- to-day personal transport	 Develop connected networks of walking and bike- riding routes Promote active transport access to regional public transport services Provide end-of-trip facilities at destinations



Achieving the above objectives requires many stakeholders to be accountable for emerging actions. It is unlikely that there is any single and unitary urban development project that can have as big an impact on regional travel patterns as a major hospital upgrade - apart from a large transport infrastructure project itself, such as a new motorway or rail line.

On this basis, NSWH should assume a proactive and continuing role in managing transport outcomes from the Stage 2 Building.

In terms of the evolving role of car parking in servicing PHC over time it is apparent that this responsibility is already accepted in principle, through the development of a Green Travel Plan and other initiatives to reduce the reliance on driving and parking that presents increasing costs to the community.

Additionally, and in recognition of the expanded hospital's unique role in shaping Penrith LGA and serving the health needs of the broader Western Sydney community, PCC and the NSW Government Transport cluster will also play significant roles in implementing this transport strategy.

The rest of this section focuses on proposed measures to address the described transport and accessibility effects of the building, nominally assigning each to an accountable owners and categorising each in terms of the preferred delivery timeframe:

- Short-term: for implementation before the completion of the Stage 1 Building
- Medium-term: for implementation before the completion of the Stage 2 Building
- Long-term: for later implementation

The following general principles apply to all measures:

- The more that demand for travel to Nepean Hospital can be shifted from driving to public or active transport use, while maintaining or improving transport safety outcomes, the better the hospital will function.
- Efforts to target this mode shift should be prioritised based on a combination of:
 - Understanding the travel choices realistically available to different hospital user groups at different times, based on when, from where and how often they are travelling
 - Weighing the relative need or prerogative of different user groups to be able to access certain travel choices with certainty.
- Measures to discourage car use will only be accepted and successful when accompanied or even preceded by the introduction of measures to encourage public or active transport use.
- The earlier that these encouragement measures can be in place, the easier it will be for NSWH to manage a reduction in the demand for car access if or when this becomes unavoidable for reasons of physical capacity.
- The most cost-effective measures to encourage public or active transport use will leverage any known accessibility advantages of PHC and optimise the use of existing and programmed transport services and assets ahead of delivering new ones.
- Wherever possible, use should be made of approaches and actions developed for and tested by use in other areas.

In relation to the last point above, there are in Greater Sydney several relevant precincts where localised actions and projects - or larger, integrated programs - have been implemented to encourage a greater share of sustainable travel, including:

- Sydney CBD
- Camperdown health and education precinct
- Westmead health and education precinct.

These examples are referenced in the following sections where they offer useful pointers for this transport strategy.



6.1.3 Movement and Place objectives for surrounding road network

This framework for the categorisation and management of different roads types is described in 4.3.7, and applied to the roads surrounding PHC. Table 12 reiterates the observed current function of each road and suggests what this function may need to be in future, in line with the strategic directions outlined above.

Road	Current function	Future function
Great Western Highway	Movement corridor	Movement corridor
Parker Street	Primary: Movement corridor as part of A9 The Northern Road Secondary: Local street for residents with street frontage	Primary: Movement corridor Secondary: Local street
Derby Street	Primary: Local street, plus special purpose as access to current Emergency Department Secondary: Movement corridor for car parking access and buses	Vibrant street, with increased frontage activity and bus access
Somerset Street	Primary: Local street Secondary: Movement corridor for car parking access	Primary: Movement corridor, including Western Sydney Airport bus services, plus special purpose as access to Stage 1 Building & Emergency Department Secondary: Local street and movement corridor for car parking access
Barber Avenue	Local street	Place for people, with primary pedestrian function, plus special purpose as access to Stage 2 Building

Table 12 - Future Movement and Place function of Penrith Health Campus surrounding road network



6.2 Travel Choices

Table 13 - Travel Choices actions

Transport strategy action	Timing (S/M/L)	Owner
Promote travel choices to staff:		
 Provide information on Travel Choices purpose Conduct staff travel survey Investigate potential for flexible work practices Promote alternative travel choices 	S	NSWH
Promote travel choices to visitors and outpatients:		
 Develop information to send with appointment confirmations Update online travel information Include live links to real-time transport apps Disseminate travel information through (e.g. referring GPs 	S	NSWH
Manage travel by delivery and service providers:		
 Investigate retimed and/or combined deliveries Develop information for businesses 	S	NSWH

TfNSW has developed the 'Travel Choices' travel demand management and behaviour change model for implementation, initially, in the Sydney CBD to mitigate the construction impacts of the CBD and South East Light Rail project, and the need to support the continuing efficient functioning of the CBD. The Travel Choices label, if not its detailed content and branding, is suitable for use when considering the actions that can be taken to encourage the more sustainable use of existing transport services and assets for travel to PHC.

Figure 36 shows the four headline components of Travel Choices as applied to the Sydney CBD. Figure 37 is the checklist of actions suggested for Sydney CBD businesses and other travel-generating land uses to implement as part of their site-specific travel action plan.



Figure 36 - Major components of Travel Choices approach



HAVE YOU THOUGHT ABOUT?	WHAT CAN YOU DO? WHAT CAN YOUR ORGANISATION DO?
STAFF TRAVEL	1. Conduct a Staff Travel Survey to inform the Action Plan. The Survey is administered and analysed by Travel Choices, to understand staff travel patterns and to inform specific advice for your organisation.
	2. Inform all staff via intranet/ newsletter/ email about CBD construction, Travel Choices' 4R's, Travel Choices' ongoing Newsflashes.
	 Display Travel Choices posters on noticeboards and/or in lifts to update staff/ visitors on ongoing changes in the CBD – Preferred driving routes map. Construction schedule map.
	4. Organise lunchtime briefing sessions to inform staff of the changes and what they can do or influence, to adapt to changed conditions.
	5. Review staff and visitor parking provision and loading dock provision and discuss management options with Travel Choices team.
	6. Check "end of trip facilities" (showers, lockers etc) are available and adequate for all interested staff. If they aren't, action steps for improvement.
	7. Develop or re-broadcast Flexible Working policies - including working from home, flexible hours, hot desking, remote working, etc.
	8. Review your business travel policy with Travel Choices assistance – encourage use of Opal cards for travel.
	9. Nominate a "Travel Choices Champion" to support initiatives for employee health & wellbeing, Sustainability, Employer of Choice.
	10. Promote participation in organised corporate events that encourage physical activity. Contact Travel Choices for a list of events, if needed.
BUSINESS TRAVEL	1. Promote the use of technology such as teleconferencing/ video-conferencing to reduce the need to attend meetings off-site.
	2. Advise staff to have meetings only between 10am-4pm, to avoid travelling in peak periods.
	3. Email communication encouraging staff to walk or take public transport to meetings where possible, particularly in or near peak periods.
	4. Provide Opal cards at reception for staff to use for travel to meetings.
	5. Promote the reduction of company carbon footprint by promoting walking targets.
	6. Provide advice to business visitors who come from the airport to travel to the office using a pre-paid Opal card and to stay in hotels within walking distance of the office.
CLIENTS, CUSTOMERS & DELIVERIES	1. Develop travel information to be sent out to customers with booking confirmations.
	2. Provide visitors with flyers on Tomorrow's Sydney.
	3. Create a business passport/ information pack for visitors that includes a range of travel options.
SUPPLIES & DELIVERIES	1. Send Travel Choices information to courier and delivery suppliers, including Loading Zone tool link.
	2. Locate or reserve off street parking for tradespeople who are working within the building.
	3. Locate additional stockpiling space to reduce number of delivenes.
	4. Discuss and arrange sharing deliveries with other building tenants to reduce overall number of deliveries to the premises.
	5. Implement a loading dock booking system to better manage receipt of deliveries on site.

Figure 37 - Travel Choices Interventions

Not all the Travel Choices actions in Figure 37 will be suitable to Nepean Hospital. In refining and implementing relevant actions for the site (Table 13) NSWH should consider the extent and outcomes of any travel demand programs implemented for other major health facilities in Greater Sydney - and, in turn, look to apply a new approach consistently across all health districts.



6.3 Walking

Table 14 - Walking actions

Transport strategy action	Timing (S/M/L)	Owner		
Promote use of existing walking connections:	(011112)			
Update existing site map with clearer walking information				
• Develop local area walking map with shortest-path routes	S	NSWH		
Show access from station and bus stops	Ĵ			
Upgrade existing walking experience:				
 Install pedestrian wayfinding signage within PCH 				
 Improve width, surface, kerbs and edge lines on internal links 				
Install accessible ramp linking Parker Street and the existing	S	NSWH		
campus footpath				
Address any gaps in snade and lighting coverage within				
Roll out these improvements for route to Kingswood station	M	PCC/TfNSW		
Upgrade pedestrian phasing at traffic signals				
Install pedestrian refuges on boundary roads	M	TfNSW		
Deliver new walking connections:				
Complete east-west and north-south internal walking routes	M-L	NSWHI		
Provide Somerset Street midblock pedestrian crossing (to align	n	DCC		
with intended Rapid Bus stop)	//\	PLL		
Provide step-free crossing over Great Western Highway	L	TfNSW/PCC		

In principle, PHC enjoys some natural advantages in promoting walking access. The site and its surrounding local street network are on generally level terrain. During the winter, autumn and spring months, the climate is mostly conducive to outdoor life. Most importantly, the campus is of a rectangular shape which mirrors the grid layout of the surrounding road network and can be conceived of as divided into four quadrants with their own points of access.

This means that the campus' structure can facilitate orientation and wayfinding within the site - subject to ongoing adjustments to the internal layout of the campus, the provision and orientation of pathways through it, and improvements to wayfinding. Drawing on ideas for better wayfinding developed when PHC's first multistorey car park (corner of Derby and Somerset streets) was built, the last of these would involve, as linked actions:

- Consistently applying the colour-coding of the different campus facilities, both in the décor of the assets themselves and on wayfinding signage
- Extending the colour-coding approach to connected walking paths (e.g., with a coloured surface treatment or edge lines)
- Physically protecting walking paths from motor vehicle incursion (e.g., with landscaping)
- Updating the site map (Figure 1) to more clearly show walking routes, accessible access routes, differentiating these walking routes from vehicle roadways, and communicating their hours of access (e.g., pathways that pass through hospital buildings may only be useable by the public during business hours).

The test of these actions being successfully implemented will be whether someone walking into PHC by any of its entrances can walk on to their destination by the shortest route, without having to ask for directions.

In the long term, as shown in Figure **38** the vision for PHC is for a traffic-free 'green street' pathway to bisect the campus on a **north-south** axis.





Figure 38 - Future Penrith Health Campus north-south pedestrian route

Uninterrupted north-south pedestrian access through PHC will only be possible when all future stages of the Nepean Redevelopment are completed.

Continuous **east-west** access may be achievable sooner. As shown in Figure 39, this would connect Barber Avenue to the existing pedestrian entry off Somerset Street.



Figure 39 - Future Penrith Health Campus east-west pedestrian route



Required works to deliver this east-west access include footpath widening on Barber Avenue (displacing some two-hour angled car parking spaces managed by PCC) and the rearrangement of other surface parking areas. In addition, a new accessible ramp linking Parker Street to the hospital campus should be provided. As shown in Figure 40 there is an existing path linking Parker Street to the hospital campus, however this includes stair-only access at Parker Street. This does not provide an accessible pathway and alternative access is provided via Barber Avenue (to the north) or Derby Street (to the south), neither of which are convenient. Therefore, an accessible ramp should be provided linking the pedestrian crossing on Parker Street to the existing footpath.



Figure 40 - Existing footpath from Parker Street (Source: Google Maps)

The eastern end of the east-west axis should connect to a new midblock pedestrian crossing of Somerset Street (see Figure 41), aligned as closely as possible with a natural desire line that brings people to PHC from Kingswood train station along the southern side of the Great Western Highway and down the eastern side of Somerset Street, and also taking into account any potential future Rapid Bus stop on Somerset Street (as an alternative to Parker Street). This desire line avoids the need for pedestrians to cross Somerset Street at the intersection with the Great Western Highway.




Figure 41 - Proposed Pedestrian Crossing

Optimally locating a midblock crossing of Somerset Street would be most effectively achieved as part of a broader suite of traffic calming and urban domain improvements for this local road and its side street intersections.

At Kingswood station itself, additional signage is needed to provide conspicuous guidance from the point of stepping off a train to the point of reaching and crossing the highway. Ideally a new pedestrian access should be installed at the western end of Kingswood Station to provide convenient pedestrian connectivity to the hospital (as shown in Figure 42).





Figure 42 - Walking route from Kingswood Station

In the longer term, the ongoing renewal of Kingswood south of the highway may create an opportunity to deliver a grade-separated crossing, with some funding potentially coming from advertising on an overbridge. Allowance should be made now for the future location of such a crossing.



6.4 Bike-riding

Table 15 - Bike-riding actions

Tra	ansport strategy action	Timing (S/M/L)	Owner
Pro	omote use of existing bicycle connections:	(3/ M/ L)	
•	Develop detailed bike-riding map with shortest-path routes		
•	Show access from points within 5km riding distance	S	NSWH
Up	grade existing bike riding experience:		
•	Install bicycle wayfinding signage and racks within PCH	S	NSWHI
•	Connect east-west GWH route to Penrith interchange	Μ	TfNSW/PCC
•	Upgrade access between this route and catchment suburbs	Μ	PCC
Deliver new bike-riding connections and opportunities:			
•	Introduce staff bike fleet for short internal and external trips	S	NSWHI
•	Partner with operator of public bikeshare scheme for Penrith	Μ	РСС
•	Provide bicycle access on Great Western Highway crossing	L	TfNSW/PCC
•	Provide longer-distance 'Green Grid' connections between Nepean Hospital and WSEA north	L	GSC/TfNSW/PCC

To some extent, any site-specific factors that facilitate walking to Nepean Hospital will also assist the take-up of bike-riding. In this case, there is value in the greater comfortable range of bike-riding compared with walking. This means that, with appropriate infrastructure in place, the bicycle will be an attractive choice for some journeys, at some times of the year, between the hospital and (to the west) Penrith city centre and (to the east) Western Sydney University Kingswood campus. These trips are a little over 2km in length and can be undertaken by bicycle in approximately 10 minutes.

Riding further, for up to 20 minutes, reaches suburbs where a significant number of staff and patients access Nepean Hospital - including South Penrith, Cranebrook, Cambridge Park and parts of Glenmore Park. Following the completion of the Nepean River Green Bridge, Emu Plains will also fall comfortably within this 20-minute catchment. The new bridge over the Nepean River removes the need for both bike-riders and pedestrians to share the Victoria Bridge river crossing with busy regional traffic - and will elevate the general profile of active transport in Penrith. In the long term, the 'Green Grid' envisaged by the Western City District Plan will enable longer-distance bike-riding, e.g., south to the WSEA.

For bike riding to be a viable proposition for as many people as possible, there is scope for some short-term improvements to the recently upgraded bicycle route along the city centre-hospital-university east-west axis, including the shared walking and bike-riding path that runs along a section of the Great Western Highway. Potential improvements include extending this route west of Parker Street (consistent with Sydney's Cycling Future), connecting it via local streets to penetrate adjacent land uses, and improving major road crossings. Within PHC, designated bike-riding routes and end-of-trip facilities will be needed (noting that the Stage 1 building currently under construction includes end-of-trip facilities to service the campus).

Subject to resources, the above improvements could be among the first projects to deliver a complete and connected 'safe cycleway network within 10km of Greater Penrith' - a 10-20-year initiative for investigation that is included in the Future Transport Greater Sydney Infrastructure and Services Plan. Figure 16 indicates the area that would be covered, incorporating a 10km catchment that extends out from Greater Penrith and Western Sydney Airport-Aerotropolis and is served in part by the Green Grid of open space active transport corridors envisaged by the GSC.



6.5 Bus

Table 16 - Bus actions

Transport strategy action		Timing	Owner
		(S/M/L)	
Pro	omote use of existing bus services:		
•	Update online travel information		
•	Provide staff Opal tickets for (e.g.) lunchtime travel into Penrith	S	NSWH
Up	grade existing bus network and services:		
•	Improve bus customer access between Derby Street and PHC	S	NSWHI/PCC
•	Use PTIPS to optimise bus services' speed and reliability	S	TfNSW
•	Consider bus priority for Parker / Derby Streets Pinch Point project	S	TfNSW/PCC
•	Operate direct services to suburbs north / south of PHC	S-M	TfNSW/Operator
Deliver new on-road public transport services:			
•	Introduce on-demand shuttle to Kingswood station	S-M	TfNSW/Operator
•	Consider new services and bus priority for corridor to St Marys	Μ	TfNSW
•	Consider on-demand services	м	TfNSW/Operator
•	Enable minibus services through PHC	M-L	NSWHI
•	Reserve / deliver bus priority, and operate rapid bus services, on The Northern Road / Somerset Street	L	TfNSW

6.5.1 Bus travel outcomes at Westmead and Camperdown Health campuses

Bus services can efficiently serve local journeys that are beyond the scope of active transport, including connecting with trains.

The theoretical catchment for PHC takes in the suburbs within a 15km radius, from which most patients and many staff travel to Nepean Hospital.

This is a major factor that distinguishes PHC transport outcomes from those observed at both the Westmead and Camperdown health and education precincts. Most parts of these two large precincts are beyond comfortable walking distance of their nearest train station (respectively, Westmead and Central / Redfern).

In Westmead's case, access from its train station is supplemented by high-frequency bus services that feed from different origin suburbs onto the North West T-way, which starts at Rouse Hill and connects this large catchment directly to the core of the precinct and onwards to Parramatta city centre. The T-way provides a fully separated roadway for buses that delivers a competitive and reliable travel time compared with driving. In the future Westmead will also be serviced by Parramatta Light Rail, connecting the precinct to North Parramatta. The T-way features visible stops which offer a good standard of customer experience (Figure 43).





Figure 43 - Hospital T-way station, Westmead

In central Sydney, customers and staff travelling to Royal Prince Alfred Hospital (RPA) and associated facilities in Camperdown have the choice of very frequent bus services operating to the north (Parramatta Road) and south (City Road / King Street) of the precinct. There is also one route that offers an all-weekday 20-minute service frequency along Missenden Road and stops directly in front of RPA. Although buses to this precinct do not enjoy the same level of infrastructure provision as the North West T-way their use is competitive with driving given the congestion of the wider road network in this area and the high cost of car parking.

While respecting Penrith's own transport conditions and culture, there are still lessons to be learned from the bus travel outcomes achieved in Westmead and Camperdown in response to investment in the speed, reliability and/or frequency of bus services.

6.5.2 Bus customer access improvements

Compared to other health campuses, and as shown in Figure 31 and Figure 32, the experience for bus customers arriving at or leaving PHC is not one that demonstrates a high value for this mode. Aspects of the short walk between Nepean Hospital buildings and Derby Street bus stops reinforce an impression of the bus as a low-status transport choice. This is at odds with both the (by Greater Sydney standards) high service frequency along this east-west spine and the improved experience which will be available to customers starting their bus journey at Penrith interchange, when the current upgrade is completed.

To address this, the improvements listed below should be considered for Derby Street:

- Relocate eastbound and westbound bus stops to be nearly opposite one another, offset from each (vehicle) approach side to a midblock unsignalised pedestrian crossing.
- Locate the bus stops and this crossing (as a replacement for the existing crossing of Derby Street) as closely as possible in line with the southern pedestrian entry to PHC and the future north-south pedestrian spine through the campus (and with the local retail centre on the southern side of Derby Street).
- Provide pedestrian-scale wayfinding signage into PHC at the bus stops and immediately outside the pedestrian entrance.



- Complement this with wider paths and clearer visibility of internal road crossing points.
- Install new shelters, seating, lighting and landscaping.

These improvements should be commenced as soon as possible and certainly as the long-term design for the southern edge of PHC further supports the relocation of bus stops and other infrastructure. In this way, bus access can be actively promoted as a transport choice that is already available to PHC staff and other user groups.

6.5.3 Bus priority opportunities

Delivering bus priority outcomes on key roads will improve the speed and reliability of Nepean Hospital bus services. In the short-term TfNSW can use PTIPS, the system delivering bus-specific traffic network and signal operations, to provide marginal improvements to existing bus services. Medium to long-term opportunities to achieve additional bus priority may be available through modifications or extensions to current road infrastructure projects.

The signalised intersection of Parker Street and Derby Street, at the south-western corner of PHC, has been recently upgraded under a combination of (for Parker Street) the NSW Government Pinch Point program and (for Derby Street) the Australian Government-funded Western Sydney Infrastructure Plan (WSIP).

As shown in Figure 47, the design for the medium-term upgrade of The Northern Road / Parker Street corridor (to be delivered under the WSIP) already includes kerbside bus priority lanes. These bus lanes will provide a public transport connection between Penrith city centre and the new Western Sydney International Airport (and associated urban development), preceding and complementing a longer-term rail link.

This bus connection, running adjacent to PHC, would constitute the northern section of a Penrith-Western Sydney Airport-Aerotropolis-Liverpool-Campbelltown-Macarthur rapid bus corridor. This priority link is referenced in transport planning for the new airport, and consistent with both Future Transport 2056 and the State Infrastructure Strategy 2018-2038. It also aligns with the Western Sydney City Deal action for the NSW Government to establish rapid bus services from Penrith to Western Sydney Airport-Aerotropolis before the airport opens.

The Greater Sydney Infrastructure and Services Plan refers to 'infrastructure to support rapid bus connections and improved [local] bus connections between WSA-Badgerys Creek Aerotropolis and Penrith' as a priority initiative for investigation, planning and possible delivery over the next decade. As illustrated by the Future Transport map at Figure 44, the corridor between Greater Penrith and Western Sydney International Airport has a 'city-shaping' function; it is one of the links needed for people living in the Western Parkland City to be able to access their nearest metropolitan centre within 30 minutes.

The State Infrastructure Strategy 2018-2038 is specific regarding the route and purpose of the high-quality rapid bus system connecting Western Sydney Airport to Greater Penrith; to help shape the new Western Parkland City before and during rail construction. As shown in Figure 17 this city-shaping route would follow The Northern Road into Penrith city centre.

The Rapid Bus route is currently planned to use Parker Street between the Great Western Highway and Derby Street, with bus stops on Parker Street, just to the north of the intersection with Derby Street. Bus passengers would be able to use the existing crossing at the Parker / Derby Street signals to cross the road. There is limited opportunity to provide bus priority on Parker Street due to general traffic demand. The Parker / Derby Street corner does not provide easy pedestrian access to PHC and it is likely bus passengers would utilise Derby Street to access the hospital facilities. As an alternative, Somerset Street would provide the opportunity to closely align bus stops with existing hospital facilities and pedestrian access points.





Figure 44 - Existing and committed Greater Sydney city-shaping network (Greater Sydney Infrastructure and Services)

For now, the proposed upgrade of The Northern Road / Parker Street corridor extends only as far north as Parker Street's intersection with Jamison Road, approximately 400m south of Derby Street (and Nepean Hospital). If this corridor is to carry rapid bus services effectively from the south past Nepean Hospital and into Penrith city centre through congested roads, bus priority will need to be extended along this section. In the longer term, bus priority needs should also be considered east of Nepean Hospital towards St Marys; and on the continuation of The Northern Road / Parker Street north of the hospital, or Somerset Street as an alternative to Parker Street, for services turning off and/or crossing the Great Western Highway.

6.5.4 Bus network redesign opportunities

Complementing infrastructure upgrades, bus network design and service improvements should be assessed and implemented for the section of the Penrith-Mount Druitt via Werrington and Great Western Highway corridor that services Nepean Hospital.

In future, if increasingly reliable scheduled bus services can be operated on the Derby Street /Second Avenue / Great Western Highway corridor that is common to the existing 774, 775 and 776 routes, customers accessing Nepean Hospital from stations east of St Marys can transfer to a 10 minute-frequency bus at St Marys. This option may be more attractive than walking to the hospital from Kingswood.

As a long-term option, there may be scope for the 774 bus route (the shortest between Penrith and Mount Druitt) to be extended as far as Blacktown, if the alignment is as direct as possible, via sections of the existing Region 1 723, 726 and 728 routes. The purpose of this would be to create a significant regional corridor anchored at both ends by a major rail-bus interchange serviced by express and Blue Mountains trains to both east and west, enabling longer-distance public transport travel to and along the full length of the PHEC. The



viability of this approach would depend on train stopping patterns, and on efficient bus stop spacing and priority to speed up travel times.

Turning to the bus service needs of suburbs to the north and south of the Great Western Highway, TfNSW has acknowledged the call for direct bus services to PHC that are comparable to east-west access. TfNSW has indicated that, subject to resources, these needs will be considered during ongoing review of the Region 1 network.

6.5.5 Demand-responsive public transport

Recent changes to the legislative and regulatory framework for the operation of public bus services in NSW have opened significant new opportunities for demand-responsive transport to connect Nepean Hospital to Penrith LGA suburbs which do not have a direct bus link to PHC currently. Under the Point to Point Transport (Taxis and Hire Vehicles) Act 2016 two major new road transport product types are now legally able to be offered to customers, as alternatives to private car use and in addition to taxi services.

First, Uber and similar operators of app-based ride providers can be expected to grow in their presence and viability, and to offer a personalised and on-demand service competitive with taxi use for hospital users such as outpatients returning home after an appointment. Second and more significantly, it is now possible to operate vehicles carrying up to 12 people (including the driver) as a commercial, fare-charging service outside the framework of a NSW Government Bus Service Contract. These services are prohibited from picking up passengers without a booking or at a rank like a taxi, and on picking up customers at a fixed route bus stop. However, services can be pre-booked online, through an app or over the phone, and can offer greater flexibility in pick up and drop off times and locations, facilitating travel to and from the customer's front door.

TfNSW will use data from on-demand public transport trials to plan future public transport improvements across all parts of Greater Sydney, potentially including Penrith. If this were to occur, it is at this point possible to envisage two main areas of opportunity for on-demand public transport to offer an attractive travel choice to Nepean Hospital:

- A shuttle connection between Kingswood train station, PHC and the Derby Street bus stops would significantly improve the viability of train travel by staff and visitors and reduce the walking distance between Derby Street bus services and the northern side of the campus. The shuttle could be timed to connect with train services, and if feasible divert from a fixed route to meet customers at any location within a set radius of the campus. This could provide a transport option to local residences and parked vehicles during wet weather and at night. Such a service has been contemplated in response to DA Condition D37 of the Stage 1 Hospital expansion, however as the service would be run by volunteers and generally older drivers, they expressed concerns over being exposed to the public and the resulting vulnerability, from a nuisance perspective, and being exposed to 'unscreened' patients and visitors. Therefore, at this stage, Kingswood Station and external bus stops are not included in scope.
- On-demand services could also find a commuter market in suburbs north and south of Penrith city centre, such as Cranebrook and Glenmore Park, which are not on the 10-minute-frequency direct bus service 'spine' between Penrith, Nepean Hospital and St Marys. In the daytime, when it is more feasible for customers to walk to and from their service, a more-or-less fixed route might operate, with the frequency of service responding to demand. During the evening, deviation from a fixed route to pick up and drop off customers would address safety concerns associated with waiting at a stop for a scheduled service.

In both cases, the design of vehicles would be an important consideration. With quiet electric propulsion technology fast becoming viable for all sizes of bus, a narrow-profile 12-seater electric minibus would even be able to drive at slow speed from one side of PHC to the other, with no more impact than existing golf buggy-style vehicles, when adequate internal pathway connections are in place. Disability access requirements would need to be addressed in the vehicle design.

If a shuttle including Kingswood Station and external bus stops were possible, a later stage in the broader Nepean Redevelopment project could include an internal 'transit mall' or similar space at the heart of the campus, and to designate minibus pick-up / drop-off spaces adjacent to car parks and other new buildings. A minibus service that was operated as part of a commercial contract for a wider area and ran through PHC, could supplement the volunteer-operated shuttle service proposed to meet DA Condition D37 of the Stage 1 Hospital expansion.



6.6 Train services

Table 17 - Train actions

Transport strategy action		Timing (S/M/L)	Owner
Pro	omote use of available train services		
•	Improve online travel information	S	NSWHI
•	Upgrade wayfinding at and outside Kingswood station	S	TfNSW/PCC
•	Introduce on-demand minibus shuttle to Kingswood station	S-M	TfNSW/Operator
•	Provide step-free crossing over Great Western Highway	L	TfNSW/PCC
Upgrade and augment existing train services:			
•	Improve bus customer access between Derby Street and PHC		
•	Consider St Marys-Penrith rail infrastructure upgrades	M-L	TfNSW
Deliver new train links:			
•	Implement outcomes of Western Sydney Rail Needs Scoping Study	L	DIRD/TfNSW

6.6.1 Promoting travel via Kingswood station

Because of growing congestion and the reduced predictability of driving times, train travel to Nepean Hospital is well placed to become increasingly attractive to staff, and administrative and daytime shift workers in particular.

The PHC staff catchment covers a broader area than is the case for the hospital's outpatients and visitors, meaning longer average trips with more likelihood of being impacted by road traffic delays. The routine nature of commuting lends itself to public transport, if it is reliable and competes with driving and parking in cost terms.

For this market, the opportunities to increase the use of train travel via Kingswood station have already been addressed in this transport strategy in the form of suggested travel information, urban domain, walking and shuttle bus improvements.

6.6.2 Increasing service frequency

Pending major rail infrastructure investment, the potential for peak period train services to stop more frequently at Kingswood is somewhat constrained by the complexity of and demands upon existing Sydney Trains operations. Notwithstanding these constraints on the network, from November 2017 more than 1,500 extra weekly Sydney Trains services have been introduced (including more than 750 on weekends). For customers travelling to PHC this has meant:

- More trains in the AM peak direction for Penrith and Kingswood stations, with a service, on average, every seven and a half minutes
- Four trains per hour in the AM counter-peak direction from approximately 6am at Kingswood, nearly doubling the previous frequency
- Double the services on weekends and late at night for customers between Penrith and Doonside, meaning a train at least every 15 minutes.

Subject to detailed trip planning, it appears that these changes offer benefits to different user groups accessing Nepean Hospital. These include staff, visitors and outpatients travelling during peak hours and on weekends. Customers commuting during peak hours from east of the hospital are particularly advantaged, given that they have previously been serviced by an essentially counter-peak direction timetable.

Opportunities to further increase train service frequency at Kingswood should continue to be investigated through later rail timetable reviews enabled by programmed infrastructure improvements, including the completion the Sydney Metro City & South West in 2024, Sydney Metro Western Sydney Airport in 2026 and Sydney Metro West projects. Additionally, there are unprogrammed and more local rail infrastructure upgrades



which would be necessary to uplift not only service frequency but train travel speed, by enabling different stopping patterns. The principal requirement for achieving this would be additional track between St Marys and Penrith. There is currently only one track in each direction between St Marys and Penrith, and the line is shared between BMT intercity, suburban and freight trains.

6.6.3 Western Sydney Rail Needs Scoping Study

In the longer term, major improvements to Greater Western Sydney rail access, including the PHEP, will result from the construction of links to Western Sydney Airport, including Sydney Metro Western Sydney Airport, connecting St Marys to the airport and Aerotropolis and due to be completed as the airport opens to passenger flights. For Penrith, better rail connections will be experienced both as more frequent and/or faster services to existing stations such as Kingswood, as capacity consumed by longer-distance travel is provided for on new train links elsewhere, including Sydney Metro Western Sydney Airport and West.

A joint initiative of the Australian Government's Department of Infrastructure & Regional Development and TfNSW, the Western Sydney Rail Needs Scoping Study investigated the need, timing and service options for rail investment to support Western Sydney Airport and the broader Western Sydney region. As shown in Figure 45, and confirmed in the Western Sydney City Deal, the number one priority corridor in the preferred rail network for Western Sydney is the North-South Link via Western Sydney Airport; now Sydney Metro Western Sydney Airport.



Figure 45 - Western Sydney Rail Needs Scoping Study preferred network



The WSRNSS finds that the North-South Link would provide significant city-shaping benefits by connecting new growth, education and employment areas. It would also add much-needed cross-regional rail capacity to serve existing travel patterns.

St Marys is the key point of interchange between Metro and the Main Western Line. For travel to and from Nepean Hospital, this interchange point will be located two train stops and approximately 7km away, requiring interchange with T1 (at Kingswood), scheduled bus or demand-responsive services to reach Sydney Metro services to WSI airport and beyond.

This distance reinforces the continuing long-term need for focus on The Northern Road, immediately adjacent to the hospital, as a primary transit (as well as general traffic) connection from PHC to Western Sydney Airport- Aerotropolis. In fact Future Transport (Figure 46) confirms the need for both a 'city-serving' corridor to connect Greater Penrith to Western Sydney Airport-Aerotropolis when the Western Parkland City is at an advanced stage of development, and the Metro connection to extend beyond St Marys, north to Marsden Park, Schofields and Rouse Hill. This would provide a rail connection to the North West Metro.



Figure 46 - Greater Sydney city-serving network vision, including city-shaping routes (Greater Sydney Infrastructure and Services Plan)



6.7 Motor vehicles

Table 18 - Motor vehicle actions

Transport strategy action	Timing (S/M/L)	Owner
Mitigate and manage motor vehicle movements within PHC:		
Remodel campus layout to remove general traffic through site		
 Provide additional drop-off / pick-up locations 	м	NSWHI
Upgrade wayfinding signage at vehicle entrances		
Mitigate and manage local street network vehicle movements:		
Provide tailored pre-trip access information to customers	S	NSWH
Upgrade wayfinding signage at main external intersections	м	NSWHI/TfNSW/PCC
Implement Local Area Traffic Management scheme	м	PCC
Expand road network capacity:		
Deliver Pinch Point upgrade at Derby / Parker streets	Μ	TfNSW/PCC
Provide for additional capacity on wider network	M-L	TfNSW/PCC

6.7.1 Road network management

Other sections of this transport strategy detail the travel demand management measures, and active and public transport improvements, which can collectively deliver more attractive non-driving travel choices to Nepean Hospital users.

Offering these choices as an alternative to use of an increasingly congested and delay-affected road network will be an important precursor to both the expansion of the hospital and longer term increases in the real costs of driving.

In the short to medium term, mitigating and managing the local network impacts of growing motor vehicle use to, from and within PHC calls for:

- Helping staff find alternatives to driving on their own to work
- Steadily reducing all opportunities for non-delivery and servicing traffic to penetrate PHC
- Making it easier for occasional drivers to PHC to know where they are going when they arrive at and enter the campus.

Actions will need to be coordinated across:

- The provision of pre-trip information e.g. with online links to apps that tailor wayfinding help to an outpatient's time, home origin and/or destination within the campus
- The installation of wayfinding signage with a consistent visual approach and an absence of clutter (such as any mixture of public health and directional messaging)
- The layout of the campus' internal road network, including the provision of additional drop-off and pick-up areas
- The layout of the external local street network, including traffic calming to reduce non-emergency vehicle incursion from regional routes (e.g., from Great Western Highway to Somerset Street), protect local amenity and improve walking access to/from external car parking.

6.7.2 Road network capacity expansion

In response to general background traffic growth in the road network, various intersections have been upgraded through the following initiatives.

Firstly, in August 2016, a \$1m upgrade by TfNSW under the NSW Government's Pinch Point Program was completed, benefiting traffic approaching the intersection along Parker Street from the north and south. The Pinch Point Program aims to reduce traffic delays, manage congestion and improve travel times on Sydney's major roads, particularly during weekday peak periods. The upgrade project (Figure 47) included:



- Extension of the northbound and southbound right-turn bays on Parker Street
- Installation of CCTV to monitor traffic
- Adjustments to traffic light phasing
- New asphalt and line marking.



Figure 47 - Pinch Point upgrade of northern and southern approaches to Parker and Derby streets intersection, Kingswood

Additionally, relevant projects have been completed by PCC (funded through the Australian Government's \$200m Local Roads Package that is part of the WSIP) to improve road safety and traffic flow efficiency at two intersections on The Northern Road / Parker Street; with Derby Street (eastern and western approaches) and with the Great Western Highway.

The WSIP-funded deliverables at these two intersections include:

- Derby Street and Parker Street intersection
 - o New designated left and right turn lanes on both Derby Street approaches
 - o Adjustments to kerb lines and footpaths
 - o Removal of some on-street parking on Derby Street to facilitate these additional turning lanes
 - o Relocation of bus stops to facilitate turning lanes.
- Great Western Highway and The Northern Road / Parker Street intersection
 - o 50m extension of the right-turn lane northbound on Parker Street
 - o 100m extension of the right-turn lane westbound on Great Western Highway
 - o Widening of the right turn lane and realignment of median island, southbound on The Northern Road
 - o New pedestrian fencing in the median island of the Great Western Highway.

In the medium term, the pressure of increased traffic will be particularly experienced near PHC on The Northern Road, including its intersection with the Great Western Highway. For this location, TfNSW should consider future land footprint requirements for an expanded intersection of these two regional routes and protect this with a corridor reservation extending north of the Jamison Road end point of the existing reservation. This is also relevant to the routing of future rapid bus services and the desireability of providing bus priority at this location.

In the longer term, traffic growth associated with the Stage 2 Building can be expected to form a minor share of overall demand increase associated with the ongoing development and urbanisation of Greater Western Sydney, including Western Sydney International airport. The Greater Sydney Infrastructure and Services Plan includes the Outer Sydney Orbital motorway between the Great Western Highway and Western Sydney



International airport that would also accommodate freight rail (see Figure 48) as a project for investigation within a 10-20-year horizon. In the very long term, the orbital is shown as connecting north to the Central Coast and south to the Illawarra.



Figure 48 - Greater Sydney strategic freight network vision (Greater Sydney Infrastructure and Services Plan)

6.8 Car Parking

Table 19 - Car parking actions

Transport strategy action		Timing (S/M/L)	Owner
Im	prove efficiency of existing on-site car parking operations:		
•	Install new static wayfinding signage Enable online booking and pre-trip tailored wayfinding	S	
•	Promote multiple-occupant car parking for staff	S-M	NSWHI/NSWH/Operator
•	Install dynamic car parking booking and management system	M-L	
Ma	nage demand for on-site and off-site car parking:		
•	Operate satellite staff / customer car park with shuttle bus	S-M	NSWHI/NSWH/PCC/Operator
•	Increase all-day parking costs above CPI	M-L	NSWHI/NSWH/Operator



Transport strategy action		Timing (S/M/L)	Owner
•	Introduce car parking restrictions on local streets in PHEP	M-L	PCC

6.8.1 Future demand for car parking

A calculation of the supply of and demand for, car parking by hospital users, informing the master planning for Stage 2, has generated data on existing and forecast future shortfalls in parking availability, as shown in Table 20.

Table 20 - Existing and future Penrith Health Campus on-site	e / off-site car parking supply and deman
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Supply / demand / shortfall		Pre Stage 1	Post Stage 1	Post Stage 2
		(2017)	(2021/22)	(2031/32)
On-site parking supply		1,509	1,859	2,008
	Staff	1,740	1,967	1,895
Demand for car parking spaces at peak	Outpatients and visitors	409	501	598
	Other	99	117	150
	Total	2,248	2,585	2,643
Estimated on-street / off-site parking used		739	726	635

While construction of PHC's second multi-storey car park (completed 2019) has increased the supply of on-site car parking to meet future demand, it is expected that it will become harder to drive to and park at or near Nepean Hospital in the future due to several factors including local apartment development and regional growth. It is also necessary to improve community access to the hospital and associated health facilities. Recognising this, a mixture of measures is needed that makes existing on-site car parking work efficiently and reduces the growth in demand for new parking.

6.8.2 Improving efficiency of car parking operations

As reported by studies to inform the business case for the second PHC multi-storey car park, approximately 16% of the public car parking spaces within PHC are unoccupied at any one time. It is unclear if spaces are hard for users to locate, or if free on-street parking is more attractive. On-street parking availability will reduce over time due to increasing residential demand and increased hospital generated demand. This will make it important for campus parking to be easy to locate and legible to users. Initially this should be addressed through improved static wayfinding signage; in the medium to long term, active and dynamic management of campus parking will be both needed and viable.

Systems with the capacity to match free car parking spaces with user demand are becoming increasingly realistic in technological and cost terms for sites such as PHC where paid car parking is distributed across many 'pods' that may include both at-grade spaces and car park structures.

The two multi-storey car parks at Nepean Hospital already have dynamic signage on the surrounding road network, to inform users of parking availability (see Figure 49).





Figure 49 - Existing dynamic signage at PHC multi-storey car park

This type of technology could be extended to at-grade parking within the campus through the deployment of in-ground sensors in all parking bays, as illustrated in Figure 50 (which includes aspects of a system currently under operation by Mosman Council).

The appropriate features of an active car parking management system for PHC would include:

- The installation of in-ground sensors in all parking bays, using wireless and battery or solar-powered technology which does not require cabling and is suited to outdoor use
- Connection of sensors to a campus-wide directional system (also incorporating the existing system in use at the multi-storey car parks) that guides drivers to available spaces at several points on approach (e.g. at an external intersection) to help the driver choose a point of entry to the campus
- The connection of sensors to parking payment facilities and to enforcement personnel, who can be alerted to overstaying vehicles
- The ability to be linked to an online and/or smartphone app-based booking system, enabling outpatients and visitors to reserve their space and be provided with detailed directions before setting out from home (or, even, at the time of making a medical appointment).





Figure 50 - Features of dynamic car parking guidance and management system

There is also the opportunity to encourage multi-occupancy vehicle use to PHC ("car pooling") through the physical design of car parking, either as a stand-alone measure or as part of an active car parking management system as outlined above. For instance, and subject to an adequate means of enforcement, some spaces for staff use can be designated for use by vehicles carrying two or more employees and located in preferential spots closest to workplace destinations. For periodic parking, payroll deduction schemes can be designed to split the cost of a reduced car parking permit across two or more employees, and this type of permit can be treated preferentially when there is a waiting list for permanent staff spaces.

6.8.3 Managing demand for car parking

Nepean Hospital has commenced developing a draft Green Travel Plan (March 2021) to address the requirements of the Stage 1 and Stage 2 SEARs.

To encourage and promote more active travel opportunities for hospital staff, the Steering Committee is considering the adoption of realistic targets that relate to the surrounding transport environment and the distances that staff travel to/from the Hospital. The targets will be set and agreed by the Steering Committee and updated annually (as a minimum) based on the level of success and feedback from staff. Indicative targets are shown in Figure 51.



Figure 51 - Transport targets - staff

* the conversion of % to people is based on the projected day shift and administration staff FTE and represents the number of vehicles that could be removed from the road network (trips) and the car park (parking demand).



In order to update these targets, the hospital should conduct an annual online questionnaire survey to track progress towards the targets and focus initiatives based on staff behaviour and attitudes.

In addition to the Green Travel Plan initiative, under 'Why work for us', the NBMLHD seeks to appeal to potential new staff with the statement that 'staff and visitor parking is readily available' at Nepean Hospital. The availability of car parking will reduce during future redevelopment of Nepean Hospital (beyond Stage 2). Assuming limits to the development of future multi-storey car parks at PHC, and/or commercial car parks outside the campus, parking-specific actions that are available to reduce on-site parking demand may include the provision of hospital parking to a satellite location and increasing the real cost of parking in order to drive a shift to other modes. For example, PCC and NSWH could jointly identify a suitable satellite parking location within a shuttle bus ride of the hospital, also cooperating with TfNSW and/or an operator to provide this 'last mile' connection. An ideal satellite car parking location would have these features:

- The site would enjoy easy access from the regional road network, and especially from roads which connect to suburbs not serviced by trains or direct buses to PHC.
- Easy access would be available from the site to one or more local streets that connect to PHC and are navigable by shuttle buses of different sizes.
- The site would already be configured for car parking (reducing the need for investment in new infrastructure such as asphalt, line-marking, lighting and CCTV) but used for this purpose mainly at times other than the Hospital's peak demand period (e.g. a sports stadium or oval).

Before considering the provision of satellite car parking, consultation to understand actual attractiveness to staff will be necessary. Provision of bus services can be costly and it is unlikely staff will pay for both parking and transport to and from the car park, leading to the need for ongoing subsidies. Car use is often predicated on convenience and the use of satellite car parking reduces of negates the convenience of car use. Experience at other hospitals, e.g. Prince of Wales, is mixed and should also be considered in planning for future off-site car parking.

Increasing the cost of PHC car parking, particularly in regard to staff parking which is currently heavily discounted, could also be considered. This should be done as an integrated action within the Green Travel Plan and tied to incentives to use non-driving options. It would also require consultation with PCC, given the potential implications for residential areas surrounding the campus (e.g., increased demand for staff parking on local streets) and council operations (e.g., parking enforcement and revenue). Subject to these considerations, there is scope for a revised car parking fees regime for Nepean Hospital to align with the relevant NSWH policy framework outlined in Section 4.5.2, under the following conditions:

- Support a sustainable model for the procurement, funding and operation of new hospital car parks.
- Ensure economic viability towards the development of new car park infrastructure.
 - Any changed pattern in the use of car parking resulting from a new pricing model must be cost-neutral to NSWH.
 - For example, a reduction in the use of all-day staff parking (say) could be balanced against increased fees from short-stay visitors and outpatients.
- Support equitable, transparent and sustainable accessibility to health campuses for all users including patients, visitors and staff, including those with special needs.
 - Under any pricing model, protection will have to be maintained for users with special access needs, by designating disabled parking spaces and continuing to offer fee concessions.
- Recognise that the parking needs of many patients and visitors need to be met on-site.
 - In principle, this means that the finite stock of on-site PHC car parking will have to be priced under a model which - compared to today - makes it more expensive for all-day, permanent use and more accessible for shorter stays by users other than employees.
 - In practice, the consequently most affected users will be administrative and daytime shift clinical staff who (compared to workers coming to and/or leaving work in the dark) can walk to and wait for public transport services in relative comfort and safety.
- Improve traffic management around health campuses.



- Increasing the relative cost of long-stay compared to short-stay car parking will increase turnover, and therefore the number of car movements to and from spaces over a 24-hour period.
- However, it may reduce the share and number of parking entries and exits happening during commuter peak periods, with road network operating benefits.
- Ensure the fees policy complements the Government's State Plan to encourage greater public transport usage, particularly increasing the proportion of total journeys to work by public transport, while recognising that many health care workers are shift workers and public transport may not provide a suitable level of accessibility at all times.
 - As noted above, a revised pricing regime for Nepean Hospital car parking can be designed to increase the cost experienced by workers for whom public transport is a practical proposition while not changing the fee for afternoon, evening and/or night shift workers.

In respect of the last points above, Table 21 compares the current cost of both short stay and all-day car parking for a Nepean Hospital full-time employee (with payroll deduction in place) to:

- Short stay and all-day PHC car parking for a casual user
- Short stay and all-day car parking for casual users at other Greater Sydney health campuses and major Penrith area land uses
- Public transport fares for typical journeys by public transport (both occasional off-peak and frequent peak).

Table 21 - Commercial car parking costs at Penrith Health Campus and comparison locations

Location and mode		Short Stay	All-day
Poprith Hoalth	Staff user (full-time)		\$4.72
Campus	Casual user	\$13.50 (2-3 hours)	\$20.20
Blacktown Hospital and Westmead Health Campus (casual users)		\$13.50 (2-3 hours)	\$20.20
Westfield Penrith (shop	oper)	Free (up to 2 hours)	\$50.00
Western Sydney Univer	sity Kingswood Campus (casual user)	\$7.00	\$7.00
Public Transport (Adult; no	Return train from / to Springwood	\$7.32 (occasional user; both trips taken between 9am and 4pm)	\$10.46 (5 x weekday peak user; maximum, assuming no other Opal use)
concession)	Return bus from / to Claremont Meadows	\$7.58 (occasional user)	\$7.58 (5 x weekday user; maximum, assuming no other Opal use)

As demonstrated by this comparison, when the cost of owning and running a car is excluded, the fortnightly, payroll-deducted cost of staff car parking at Nepean Hospital equates to a significantly lower sum than public transport use.

6.9 Emergency vehicles

Table 22 - Emergency vehicle actions

Transport strategy action	Timing (S/M/L)	Owner
Maintain or improve speed and reliability of emergency vehicle a	ccess:	
 Reconfigure Somerset Street/ Great Western Highway intersection Reduce non-emergency and local access use of Somerset Street 	S-M	TfNSW/PCC



Approximately 30% of Nepean Hospital Emergency Department presentations arrive by ambulance, with most of the remainder coming in a private vehicle. Table 23 shows the projections for annual and average daily ambulance arrivals at the hospital in 2026/27 (i.e., following the completion of the Stage 2 Building), compared to current.

Ambulance arrivals	Current	2026/27	
Annual ED Presentations	69,910 ¹⁰	100,16711	
Arrivals by Ambulance (30%)	20,973	30,050	
Daily average (365 days)	57	82 (+44% compared to current)	

Revised arrangements for access to the hospital Emergency Department are shown in Figure 52. Under these arrangements, access will be relocated from Derby Street to Somerset Street, and private vehicle drop-offs will be separated from ambulances.

While Somerset Street will be more readily accessible than Derby Street to ambulances coming from the Great Western Highway, there is the opportunity for the highway's intersection with Somerset Street to be reconfigured so that other, non-emergency vehicles are prohibited from making some or all movements. This will reduce growth in general traffic using Somerset Street and enable the provision of a midblock unsignalised pedestrian crossing at a location integrated with new points of access to the Nepean Hospital Emergency Department.

¹⁰ Per ptc. parking demand studies (2017)

¹¹ Per **ptc.** parking demand studies





Figure 52 - Future Nepean Hospital Emergency Department and ambulance access



6.10Proposed Access



The proposed accesses for the Stage 2 Building are shown in

Figure 53 below:

- Barber Avenue provides access for vehicles from Barber Avenue and for pedestrians from the north and north-west directions. A drop-off zone will be provided in front of the Stage 2 building.
- Somerset Street will be a new access point.





Figure 53 - Proposed Access of Nepean Hospital Redevelopment Stage 1 & 2 (NHR2_Access summary and diagrams SD report)



7 Conclusions

Analysis reported in this transport strategy shows that travel generated by the Stage 2 Building will be able to be accommodated by existing road, public transport and active transport networks and services. The project will not require these to be expanded.

The need for substantial changes to access arrangements for Nepean Hospital does, however, change when a longer-term horizon is considered, including the potential for further development of the PHC and wider urban development across Western Sydney.

Within this horizon, assuming no change to the existing patterns and modes of travel to PHC, local and regional road networks will require expansion and/or drivers will have to accept substantially slower travel speeds than today. In addition, and regardless of the time it takes to drive to PHC, the effort and cost associated with parking a car in or near the campus will increase as demand outstrips the capacity of both paid and free parking.

This transport strategy therefore outlines a program of short, medium and long-term transport actions to be embarked on now so that Nepean Hospital is well-positioned, when the time comes, to maintain its customers' equitable access to health services while continuing to attract a qualified workforce. Under this 'Green Travel Plan' approach, taking sooner action to offer 'carrots' for sustainable travel choices will reduce the later pain and cost of using 'sticks' to discourage driving and parking.

A Green Travel Plan to support Stage 1 and Stage 2 Buildings is made up of the actions listed in this strategy. The Green Travel Plan is summarised below under three principal steps and illustrated in Figure 54 as a process that achieves more sustainable travel outcomes for Nepean Hospital by selecting the most cost-effective initiatives in response to available resources. The Green Travel Plan will be implemented by the Local Health District, supported by facilities delivered by Health Infrastructure through the redevelopment of Nepean Hospital.

7.1 Nepean Hospital Green Travel Plan

- Step one: Promote better use of available travel opportunities
 - Improve the efficiency of existing on-site car parking operations
 - Promote the use of existing walking and bicycle connections
 - Promote the take-up of existing bus and train services.
- Step two: Improve the customer experience, capacity and impacts of existing transport operations
 - Actively manage motor vehicle movements to and within PHC
 - Manage local street network vehicle movements outside PHC in line with Movement and Place principles
 - Upgrade walking and bike-riding facilities, especially wayfinding, with a focus on connections to public transport
 - Rearrange existing bus services where possible to address network gaps.
- Step three: Introduce new public and active transport products, and start to shift demand away from driving
 - Deliver new walking and bike-riding connections within and outside PHC, including step-free access to Kingswood station, and between Parker Street and PHC
 - Deliver new on-demand public transport services to fill in remaining temporal, route and capacity gaps, and to penetrate the campus using low-impact vehicles
 - Relocate car parking to one or more satellite locations
 - Manage access to, and the cost of, car parking within and outside PHC based on user need and access to alternative travel options
 - Provide or at a minimum protect the future opportunity for bus priority access on the principal routes to PHC.





Figure 54 - Nepean Hospital Green Travel Plan